

~~SECRET~~

ENVIRONMENTAL PROTECTION SECTION

UNCLASSIFIED

Report No. 179

Reproduced From
Best Available Copy

IRAN

**ENVIRONMENTAL CONDITIONS
AFFECTING LOGISTICS**

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

20010719 072



Research and Development Branch
Military Planning Division
Office of The Quartermaster General
July 1951

UNCLASSIFIED

ICASRO LOG NO. 67-92

APR 22 1952

JUN-06-2001 09:01

DTIC-DC

703 767 9244 P.06/06

P.2

DEFENSE TECHNICAL INFORMATION CENTER REQUEST FOR SCIENTIFIC AND TECHNICAL REPORTS		
Title		
<p>1. Report Availability (Please check one box)</p> <p><input checked="" type="checkbox"/> This report is available. Complete sections 2a - 2f.</p> <p><input type="checkbox"/> This report is not available. Complete section 3.</p>		
2a. Number of Copies Forwarded		2b. Forwarding Date
		28 Jun 01
<p>2c. Distribution Statement (Please check ONE box)</p> <p>DoD Directive 5230.24, "Distribution Statements on Technical Documents," 18 Mar 87, contains seven distribution statements, as described briefly below. Technical documents MUST be assigned a distribution statement.</p> <p><input checked="" type="checkbox"/> DISTRIBUTION STATEMENT A: Approved for public release. Distribution is unlimited.</p> <p><input type="checkbox"/> DISTRIBUTION STATEMENT B: Distribution authorized to U.S. Government Agencies only.</p> <p><input type="checkbox"/> DISTRIBUTION STATEMENT C: Distribution authorized to U.S. Government Agencies and their contractors.</p> <p><input type="checkbox"/> DISTRIBUTION STATEMENT D: Distribution authorized to U.S. Department of Defense (DoD) and U.S. DoD contractors only.</p> <p><input type="checkbox"/> DISTRIBUTION STATEMENT E: Distribution authorized to U.S. Department of Defense (DoD) components only.</p> <p><input type="checkbox"/> DISTRIBUTION STATEMENT F: Further dissemination only as directed by the controlling DoD office indicated below or by higher authority.</p> <p><input type="checkbox"/> DISTRIBUTION STATEMENT X: Distribution authorized to U.S. Government agencies and private individuals or enterprises eligible to obtain export-controlled technical data in accordance with DoD Directive 5230.25, Withholding of Unclassified Technical Data from Public Disclosure, 6 Nov 84.</p>		
<p>2d. Reason For the Above Distribution Statement (in accordance with DoD Directive 5230.24)</p> <p><i>Originators deemed the information unclassified and suitable for public release</i></p>		
2e. Controlling Office		2f. Date of Distribution Statement Determination
AMSSB-OSA(N)		28 Jun 01
<p>3. This report is NOT forwarded for the following reasons. (Please check appropriate box)</p> <p><input type="checkbox"/> It was previously forwarded to DTIC on _____ (date) and the AD number is _____</p> <p><input type="checkbox"/> It will be published at a later date. Enter approximate date if known.</p> <p><input type="checkbox"/> In accordance with the provisions of DoD Directive 3200.12, the requested document is not supplied because:</p>		
Print or Type Name		Signature
Carl E. Taylor, Jr.		<i>Carl E. Taylor</i>
Telephone		(For DTIC Use Only) AQ Number
508-233-4527		

~~CONFIDENTIAL~~
UNCLASSIFIED

Department of the Army
OFFICE OF THE QUARTERMASTER GENERAL
Military Planning Division
Research and Development Branch

Environmental Protection Section
Report No. 179

IRAN

ENVIRONMENTAL CONDITIONS
AFFECTING LOGISTICS

By
Earl E. Lackey
Consultant Geographer

Washington, D. C.

July 1951

"This document contains information affecting the National Defense of the United States within the meaning of the Espionage Act, 50 U. S. C., 31 and 32, as amended. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law."

~~CONFIDENTIAL~~
UNCLASSIFIED

Iran: Environmental Conditions Affecting Logistics

Summary: Iran is a significant part of the 12,000-mile barrier of mountains, plateaus, deserts, and basins that stretches through the Eurasian continent from Spain to Bering Strait (Fig. 1). The terrain, climate, and latitude of Iran bear considerable resemblance to corresponding features of northwest Mexico combined with Arizona, New Mexico, Utah, and Nevada (Fig. 2). Iran is composed of many high mountains and ranges which enclose numerous arid basins, varying in area from a few square miles to many thousands of square miles. Only a small part of the country is lowlands.

All of the country is very warm and dry in summer with average temperatures of the warmest month near 90°F. In winter average temperatures of the coldest month vary from 67° at Jask (13 feet altitude) on the south coast to 17° at Tabriz (4,423 feet altitude) on the plateau in the far northwest. Along the south coast and in the interior the low winter rainfall of 4 to 10 inches is in contrast to the winter rainfall of 30 to 50 inches on the Caspian Sea coast. These differences in climatic seasonality are further accentuated by differences in altitude, which vary from below sea level on the Caspian coast and near sea level on the southern delta and coast lands to the high plateau lands (2,000 to 5,000 feet) in the interior, and the lofty mountains on the margins (10,000 to 15,000 feet).

Together the factors of terrain and climate require careful evaluation in relation to clothing, shelter, storage, and other factors pertaining to the efficiency and comfort of combat soldiers. Four clothing groups needed for combat troops in Iran are listed, together with suggestions relative to the time of the year and parts of the country in which each is to be worn. In succeeding sections, brief surveys are given on storage, shelter, insect pests, water supplies, fuel supplies, and food requirements.

CONTENTS

	Page
1. Introduction	1
a. Terrain	1
b. Climate	2
2. Regions	8
a. Northern Division	9
b. Southern Division	14
c. Central Division	18
3. Clothing	23
a. Warm Weather Clothing	24
b. Cool Weather Clothing	24
c. Cold Weather Clothing	26
d. Very Cold Weather Clothing	30
e. Items Recently Standardized	30
4. Shelter and Storage	31
a. Summer	31
b. Winter	31
5. Food, Water, and Insects	33
a. Food	33
b. Water Needs	33
c. Water Supplies	35
d. Insects	35

Preface

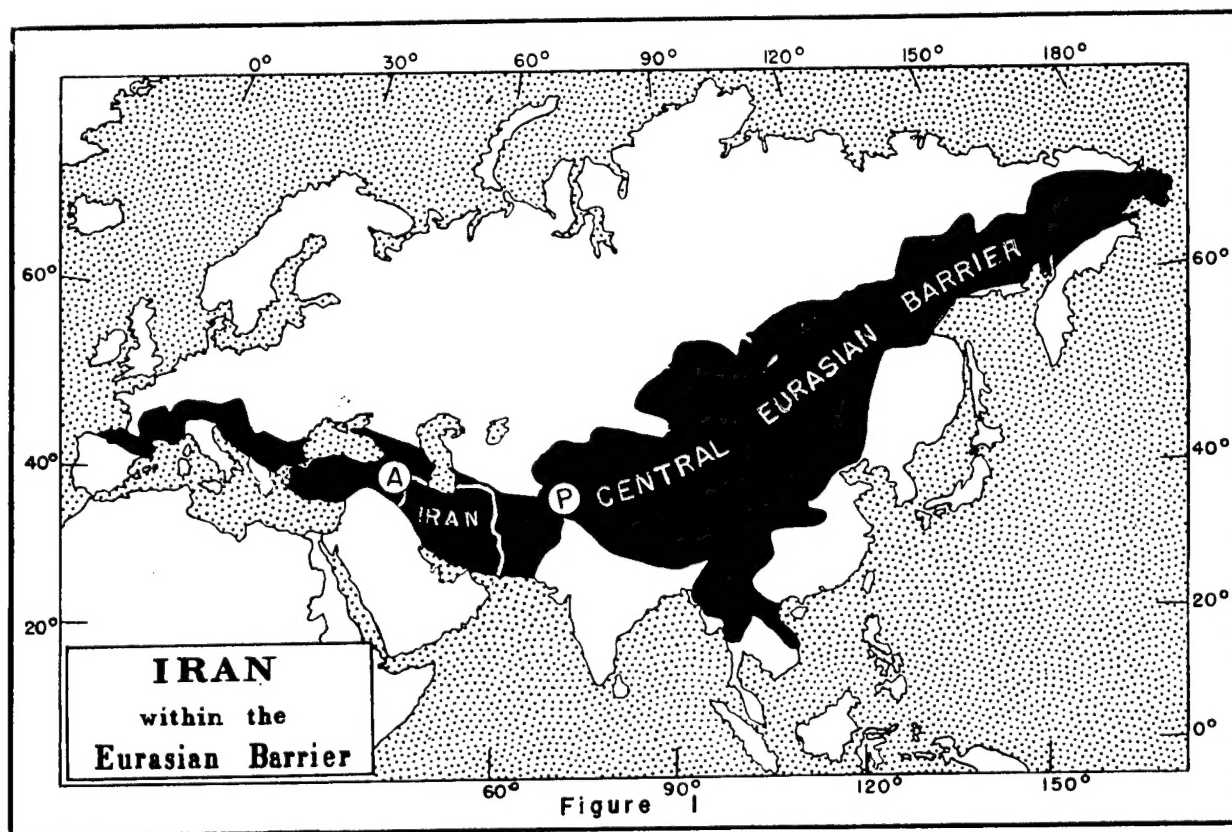
Iran occupies a significant portion of the 12,000-mile Central Barrier of mountains, plateaus, basins, and deserts that stretches across the Eurasian continent from the Pyrenees to Bering Strait (Fig. 1). Its importance as part of this Barrier, between the heartland of Eurasia and the southern coastal areas, is as great today as at any time in history. The environment of Iran is discussed in detail in this report, emphasizing those aspects which determine the requirements of ground troops for supplies of clothing, food, shelter, and personal equipment.

This report is one of a series analyzing environments in terms of Quartermaster activities in various areas of the world, prepared at the request of the Chief of the Military Planning Division, Office of The Quartermaster General. It was compiled in the Protection Requirements Unit at Cameron Depot, Virginia, under the immediate supervision of F.P. de Percin. It was edited by Arnold Court.

APPROVED:

Hoyt Lemons
Associate Research Director
for Environmental Studies

William McK. Mantz, Lt. Col., QMC
Research Director
Environmental Protection Section

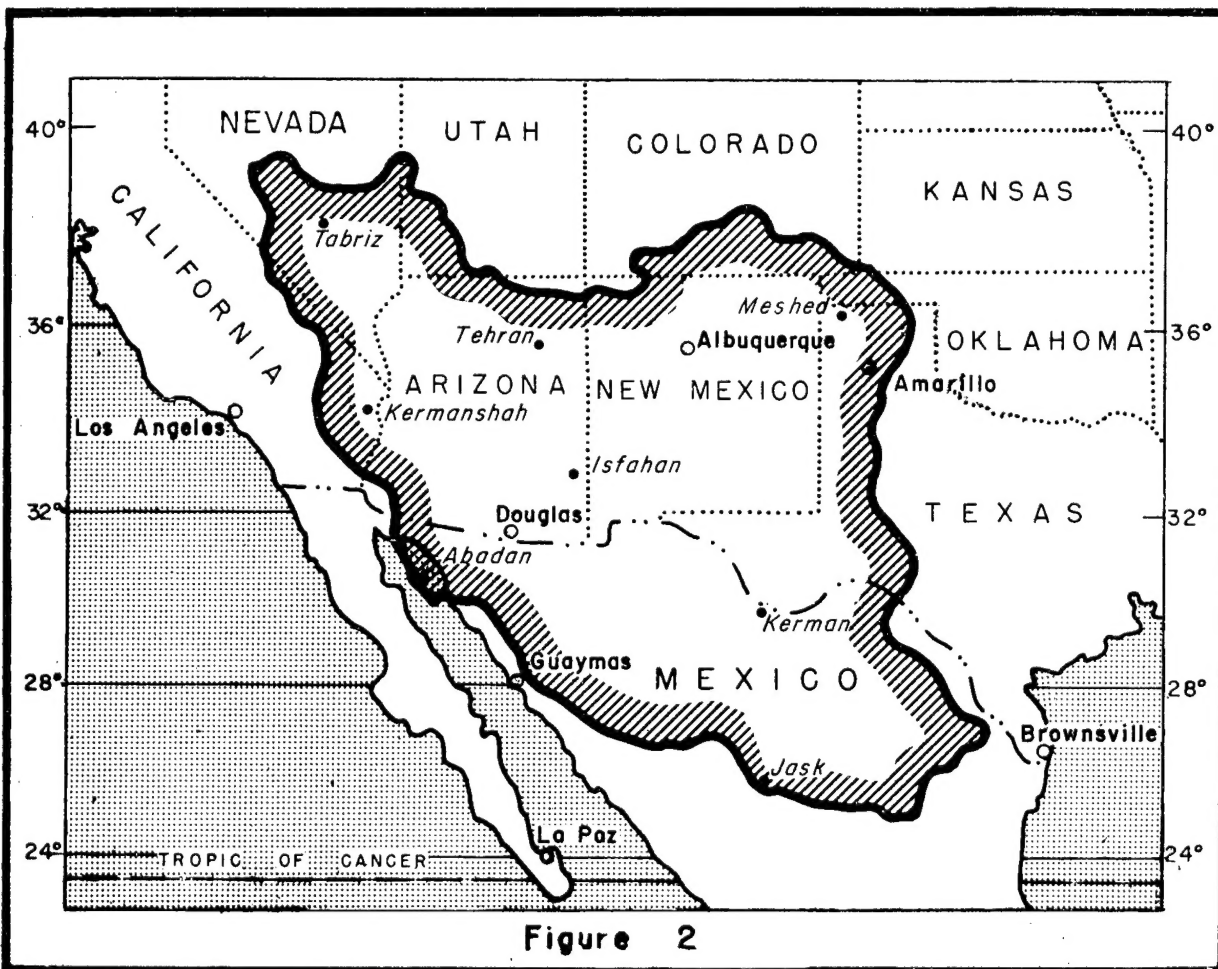


Iran: Environmental Conditions Affecting Logistics

1. Introduction

If Iran were superimposed on North America in corresponding latitudes ($24^{\circ}15'$ to $39^{\circ}45'N$), it would extend from Monterey, Mexico, to Reno, Nev., and from San Diego, Cal., to Amarillo, Tex. Its area (628,000 square miles) is about four-fifths that of Mexico, or about that of the states of New Mexico, Arizona, Colorado, Utah, Nevada, and Wyoming, combined (Fig. 2).

a. Terrain. In terrain and climate, Iran is roughly similar to this corresponding portion of North America. Both areas have rugged mountain rims and important interior basins and mountain ranges. However, most of Iran is much more arid than its North American counterpart, and there are more areas which are too hot and barren for any self-supporting human settlement.



7118 - EPS - OQMG 4/1/51

Iran, as a part of the barrier between northern and southern Eurasia (Fig. 1), includes two series of mountain chains that diverge and extend eastward from the Armenian mountain knot on the west, and converge toward the Pamir mountain knot on the east. Between these two series of ranges

is the interior plateau of Iran, made up of numerous mountain ranges and basins. About one-half of this great plateau is in Iran, the other half in Afghanistan and Pakistan.

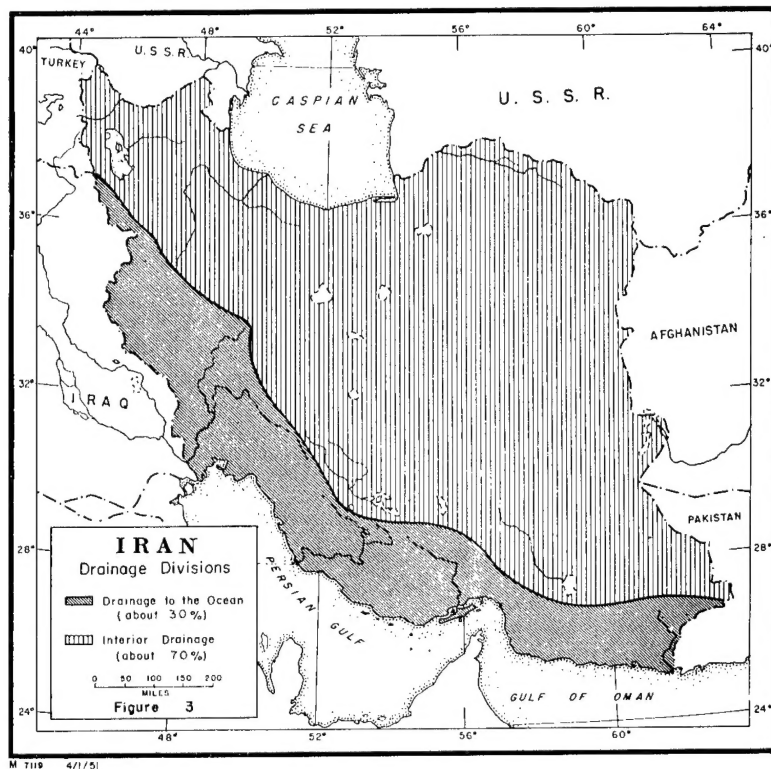
The main mountains north of the plateau are the Elburz and the Kopet, the latter a trans-Caspian extension of the Caucasus Ranges. South of the plateau are three arcs of ranges; the Khurdistan, the Fars, and the Makran.

About 30 percent of the country drains southward to the ocean (Persian Gulf and Gulf of Oman), and the other 70 percent drains (Fig. 3) into large interior salt basins and lakes, of which

the Caspian Sea is the largest. The terrain of the interior drainage area is much like that of Utah and Nevada between the Rocky Mountains and the Sierra Nevada.

b. Climate. Most of Iran is hot and dry, in places as hot and dry as any place in the world. Only in extreme northern Iran, around the southwestern corner of the Caspian Sea, is there enough rainfall (Fig. 4) to support agriculture. The climate of this coastal area, as described by records from Astara and from Lenkoran, just across the border in the U. S. S. R., is similar to that of North Carolina in temperature and amount of rainfall, but the rain comes chiefly in winter as it does in Oregon and California (Table II). Elsewhere in Iran, climates are similar to those found in southwestern United States and northern Mexico (Table I).

Temperatures below freezing occur throughout Iran except along the southern coast, facing the Arabian Sea and Persian Gulf, and temperatures over 100° have been recorded everywhere except for the Caspian shore. At Andimishk, about 150 miles north of the head of the Persian Gulf, maximum temperatures of 110° or higher were recorded on 87 out of 92 days during the summer of 1944; at Abadan, at the head of the Gulf,



such temperatures occurred on 64 percent of the summer days in 1944 and 1945. Average monthly temperatures (Fig. 4) throughout Iran are between 30° and 100°.

Precipitation in Iran has different characteristics in three major regions:

- (1) Northwestern Iran and Caspian coastlands;
- (2) The central mountain ranges and plateau;
- (3) The Persian Gulf area.

In the Caspian area, sheltered from the larger influences of the general pressure distribution, local winds and local weather are outstanding in their diversity. The amount of rainfall and its distribution throughout the year vary greatly over the region: on the western and southwestern Caspian coast the greatest rainfall occurs in September, while on the southeast coast, where the rainfall is only a small fraction of that on the southwest coast, the months of greatest precipitation are January and March. Snow occurs generally above 5,000 feet, with snow cover lasting for about two weeks on the lower ground and for about six months at altitudes above 6,000 feet.

In western Iran practically all the precipitation falls from November to May inclusive, with March the wettest month and January the next wettest; it is derived either from winter storms from the Mediterranean or from local showers. The most persistent falls, though not necessarily the heaviest, are experienced with a south or north air flow from a minor storm in

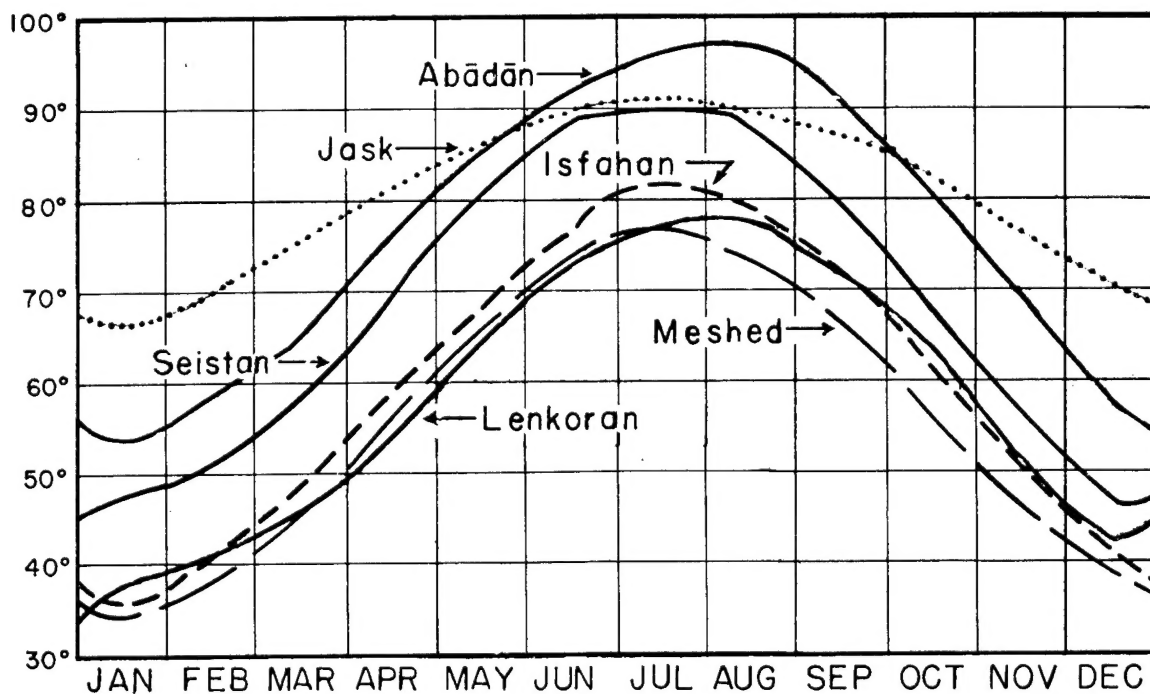


Figure 4: Mean Monthly Temperature Regimes in Iran.

TABLE I: COMPARISON OF WEATHER RECORDS IN IRAN AND NORTH AMERICA

	NORTH LATI- TUDE	ALTI- TUDE (ft.)	MEAN ANNUAL PCPN. in.	TEMP. °F.	MEAN DAILY				EXTREMES			
					Maximum JAN	Maximum JUL	Minimum JAN	Minimum JUL	Maximum JAN	Maximum JUL	Minimum JAN	Minimum JUL
<u>NORTHERN</u>												
Lenkoran, USSR	38°46'	-66	44.2	58	41	84	32	68	68	97	10	46
Portland, Ore.	45°30'	57	42.3	53	44	78	34	56	62	104	-2	41
Astara	38°27'	-69	53.3	58	---	---	---	---	56	89	18	60
Durham, N.C.	36°01'	406	41.2	59	50	89	29	68	75	104	6	54
Ashuradeh	36°52'	-82	18.3	63	---	---	---	---	---	---	---	---
Fresno, Calif.	36°47'	327	9.2	63	54	99	38	65	73	115	17	50
Meshed	36°15'	3104	9.1	57	46	92	22	63	72	112	-8	46
Albuquerque, N.M.	35°00'	5196	8.6	56	47	90	22	62	70	104	-4	44
Tabriz	38°05'	4423	---	54	---	---	---	---	---	---	---	---
Basin, Wyo.	44°23'	3837	7.0	45	29	92	2	56	60	114	-42	36
<u>SOUTHERN</u>												
Kermanshah	34°14'	4860	18.5	56	41	96	23	63	58	106	-8	46
Mina, Nev.	38°20'	4350	3.5	54	46	96	19	61	70	109	-22	32
Khurramshahr	30°28'	10	5.9	76	64	103	46	82	76	120	30	73
Yuma, Ariz.	32°40'	141	3.6	73	68	106	42	77	84	118	22	61
Bushire	28°59'	14	10.8	75	64	95	51	84	80	112	32	74
Guaymas, Mex.	27°59'	30	11.1	76	74	94	55	80	98	114	33	53
Jask	25°45'	13	4.8	80	74	96	60	85	85	112	42	76
La Paz, Mex.	24°10'	59	5.7	75	72	91	53	77	89	105	41	64
<u>CENTRAL</u>												
Kerman	30°21'	6100	5.4	63	61	101	29	62	75	112	7	48
Douglas, Ariz.	31°21'	3989	12.5	62	62	93	29	65	82	111	-7	41
Isfahan	32°38'	5817	4.3	60	47	98	24	67	69	107	-4	48
Alamo, Nev.	37°25'	4130	6.9	55	52	98	21	55	69	111	-5	40
Zahidan	29°30'	4718	3.1	62	55	97	28	68	78	107	10	59
Barstow, Calif.	34°54'	2105	4.0	63	59	101	31	67	86	114	12	50
Seistan	31°02'	2000	1.7	69	58	103	34	79	78	112	17	65
Phoenix, Ariz.	33°25'	1108	7.6	70	65	103	39	77	84	119	12	46
Kashan	34°00'	3190	---	62	---	---	---	---	---	---	---	---
Lees Ferry, Ariz.	36°50'	3142	6.2	61	46	101	24	71	66	112	9	61
Telleran	35°41'	4000	9.2	62	47	98	24	67	64	109	-4	58
St. George, Utah	37°08'	2880	8.6	59	53	101	23	63	71	115	-1	43

TABLE I: COMPARISON OF WEATHER RECORDS. Continued

MEAN MONTHLY TEMPERATURE												
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
												<u>NORTHERN</u>
38	41	46	54	65	74	78	78	71	62	51	43	Lenkoran, USSR
39	42	47	52	57	62	66	67	62	55	46	41	Portland, Ore.
40	42	46	54	65	73	76	77	70	62	52	44	Astara
40	44	49	58	66	75	78	76	73	60	49	42	Durham, N.C.
45	48	52	59	70	77	81	81	77	67	56	51	Ashuradeh
46	52	55	61	67	75	82	80	73	65	55	46	Fresno, Calif.
34	38	46	56	67	74	77	74	67	57	47	39	Meshed
35	40	47	55	64	73	76	74	68	56	44	35	Albuquerque, N.M.
17	25	39	54	63	74	79	81	73	62	48	34	Tabriz
15	22	34	47	56	66	74	72	60	47	32	18	Basin, Wyo.
												<u>SOUTHERN</u>
32	36	44	52	62	72	80	79	70	62	48	37	Kermanshah
33	39	44	52	60	70	78	76	66	53	43	39	Mina, Nev.
55	59	65	75	85	90	92	93	88	81	69	57	Khurramshahr
54	59	64	70	76	85	91	90	84	73	62	55	Yuma, Ariz.
57	59	66	74	83	87	89	91	87	80	71	61	Bushire
63	66	69	73	77	83	87	86	86	81	72	65	Guaymas, Mex.
67	69	74	80	85	90	91	89	87	83	76	71	Jask
63	64	67	70	74	77	82	84	83	80	73	65	La Paz, Mex.
												<u>CENTRAL</u>
45	46	51	61	72	81	81	78	71	63	55	45	Kerman
46	50	55	61	68	77	79	78	74	64	53	45	Douglas, Ariz.
35	41	49	59	69	77	83	80	73	61	50	41	Isfahan
37	40	46	53	62	70	77	73	65	55	46	39	Alamo, Nev.
41	45	51	62	74	81	83	80	71	62	51	43	Zahidan
46	50	56	62	68	78	84	82	74	60	54	46	Barstow, Calif.
48	51	59	70	81	89	90	89	79	69	57	47	Seistan
51	55	61	67	75	84	90	88	82	70	59	52	Phoenix, Ariz.
35	36	43	60	74	83	90	85	77	68	53	42	Kashan
35	44	51	60	71	80	86	83	75	61	47	37	Lees Ferry, Ariz.
35	41	49	60	70	80	85	84	77	64	53	42	Teheran
38	43	50	58	67	77	83	81	72	60	48	38	St. George, Utah

the Basra area. Topography is the chief factor determining the distribution of rainfall; since precipitation comes from the west to south, places near the west or south edge of mountains receive the earliest and also the largest amounts. By the time eastward moving fronts and moist air streams reach Teheran and Arak they have been dried out considerably. The magnitude of the orographic effects is shown at Qum, on a plain with no mountain ranges nearby providing orographic uplift to produce rain or snow. Consequently, Qum, though generally in the same air stream as Arak and Teheran, has on the average less rainfall than either, only about 4 inches. Snowfalls occur above 3,000 feet altitude, usually from December to March, and snow cover may last for six months. Precipitation fades out to practically zero over the desert wastes towards the Afghan frontier, and in the Kavir areas it is estimated that annual precipitation may be less than 2 inches (Table II).

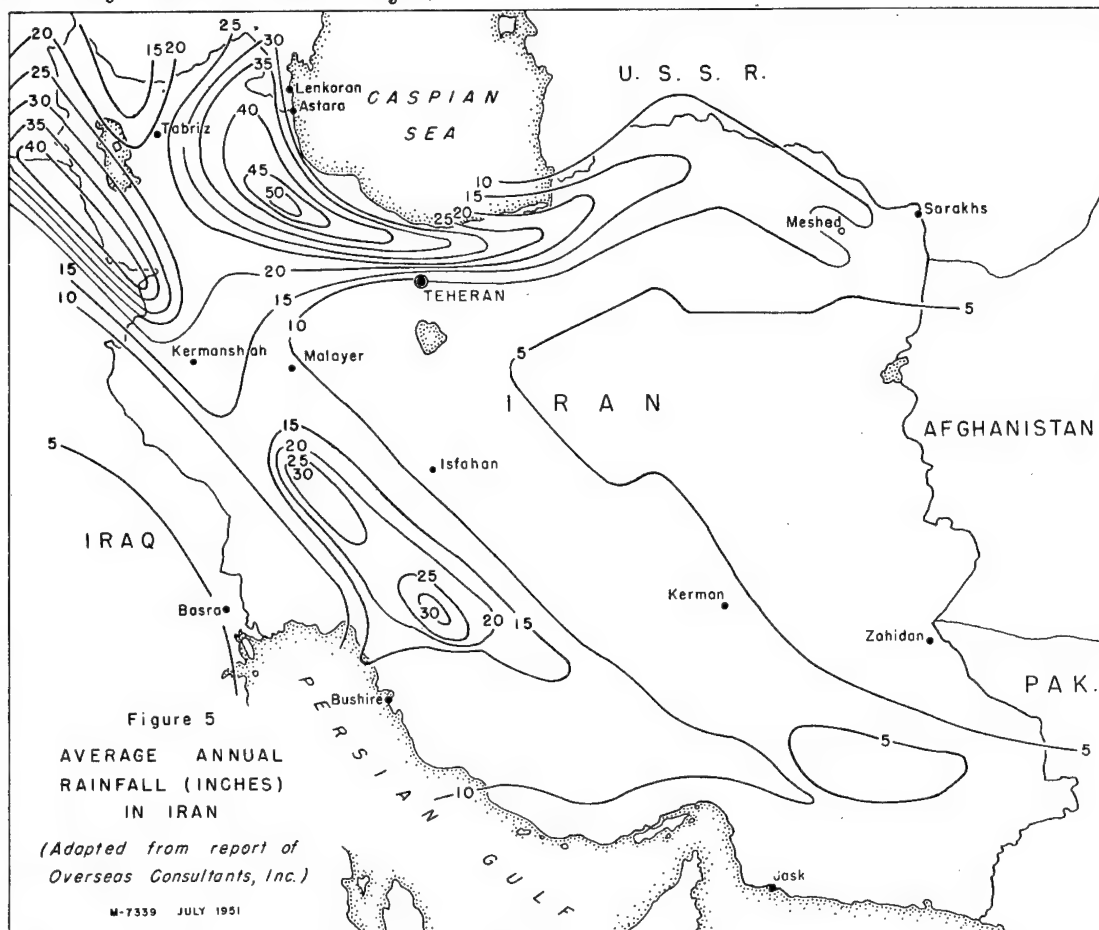
Over most of the southwest plains and Persian Gulf area, the small and variable rainfall depends largely on the configuration of the land; the places with heaviest falls are among the hills. Practically all the rainfall occurs in the winter half-year (November to April), associated with disturbances which move from the eastern Mediterranean to the head of the Persian Gulf area with accompanying fronts. The precipitation is sometimes very heavy, especially in thunderstorms, but usually does not last for more than 12 hours. In the Makran area there may be less than 3 inches per year for two or three consecutive years, and any month may be rainless. The monsoon does not seriously affect precipitation in Iran, although it may bring a small amount of rain for about two days in July.

TABLE II: RAINFALL (in inches) IN IRAN

	LATITUDE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Astara	38°27'	2.6	3.7	3.7	3.0	2.0	1.4	1.1	3.3	7.0	12.9	6.9	3.7	51.3
Ashuradeh	36°52'	1.5	1.6	1.4	0.9	1.5	0.6	1.1	0.6	4.7	1.1	1.1	2.2	18.3
Kermanshah	34°14'	1.7	1.0	3.4	3.2	0.9	0.1	0.0	0.0	0.0	0.3	2.4	2.7	15.9
Ahwaz	31°20'	2.0	1.3	2.1	0.8	0.0	0.0	0.0	0.0	0.0	0.2	1.0	2.4	9.8
Bushire	29°00'	2.9	1.8	0.8	0.4	0.1	0.0	0.0	0.0	0.0	0.1	1.6	3.1	10.7
Jask	25°45'	1.2	0.9	0.6	0.2	0.0	0.1	0.1	0.0	0.0	0.2	0.3	1.2	4.8
Kerman	30°21'	0.5	0.9	0.9	0.7	0.1	0.2	0.0	0.0	0.1	0.1	0.5	1.4	5.4
Isfahan	32°38'	0.6	0.4	1.0	0.6	0.2	0.0	0.0	0.0	0.0	0.1	0.6	0.8	4.3
Sahidan	29°30'	0.8	1.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.2	3.1
Seistan	31°02'	0.4	0.4	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.7
Meshed	36°15'	0.8	1.0	2.2	1.8	1.2	0.3	0.1	0.0	0.0	0.4	0.6	0.7	9.1
Teheran	35°41'	1.7	1.0	1.9	1.1	0.4	0.1	0.2	0.0	0.1	0.3	1.1	1.3	9.2

Few existing weather stations have sufficiently long records to illustrate the extreme variability of annual precipitation over all Iran. At Bushire in 1894 the rainfall was nearly three times the mean (10.7 inches), and in 1922 it was less than one-fifth of the mean. In common with other arid areas, Iran has both a most uneven distribution of rainfall and wide fluctuations from year to year.

Winds throughout the year are generally from the north, except along the Persian Gulf, where land and sea breezes alternate almost every day. In the desert and mountain basins severe dust storms occur. In winter they are usually associated with the passage of storms to the north; in summer these storms are often of local origin. Face protection is essential, and shelter is necessary in the more severe storms, which may last several days.



Relative humidity is generally low over the Persian interior most of the year, but on the southwest Caspian Coast the average relative humidity is above 75 percent in every month but July, and more than 90 percent during the cooler six months. On the hot southern coast of Iran the average relative humidity is always near 65 percent or above (Jask, Fig. 6). On summer mornings, surfaces conducive to condensation fairly drip with dew. The high humidity throughout the year at Jask on the southern coast, where temperature is also high, causes storage problems.

Visibility is generally excellent in all parts of Iran but in various parts may be restricted by dust and sand storms, mirages, fog, or falling snow. The first two of these obstacles are related to the aridity and high temperatures of the interior. The latter two are confined for

the most part to the northern section of the country. Mirages are common on hot days on large flat areas of arid terrain; consequently, much of the interior of the country is subject to this confusing phenomenon.

Only along the Caspian Coastlands is there a large percentage of cloudy weather; there fully one-half the days may be overcast. In the interior and on the south coast it is not unusual for the sky to be cloudless or nearly cloudless 60 percent to 80 percent of the time. The sun's glare makes sun glasses advisable for eye protection.

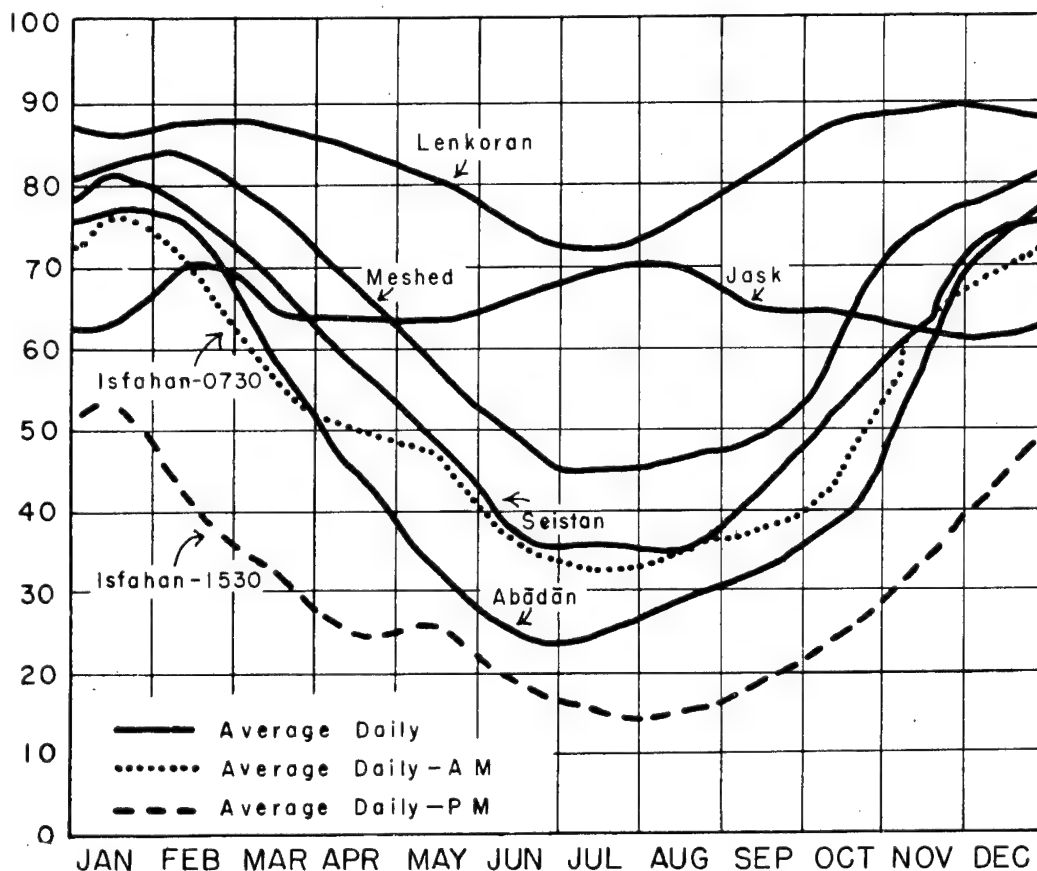


Figure 6: Average Relative Humidities in Iran

2. Regions

For more detailed discussion of physiography and climate, Iran is divided into three major divisions, Northern, Southern, and Central, each of which is further subdivided into regions of generally similar terrain and climate (Fig. 7). For each of these ten regions, terrain, climate, and clothing needs are discussed in this section.

The discussion involves four groups of clothing, whose composition is itemized and discussed in detail in Section 3. Each is generally suitable for wear within specified ranges of mean monthly temperatures:



Figure 7: The Manjil Road from Teheran to the Caspian Coastlands through the Sefid Rud Valley in the Elburz Mountains (Aug. 1947). On the valley floor, wet ground conditions in summer impede movement; on the upper slopes, heavy snows in winter similarly hamper travel and operations.

Warm Weather Clothing, above 68°F
 Cool Weather Clothing, 50° to 68°
 Cold Weather Clothing, 14° to 50°
 Very Cold Weather Clothing, below 14°

These limits are not absolute: each group provides adequate comfort and protection for a somewhat wider range of temperatures, so that there is considerable overlap between the groups so far as adequate protection is concerned.

a. Northern Division. The three areas of the Northern Division are: the Caspian Lowlands, bordering a great salt sea and almost wholly below sea level; the Elburz Mountains and Kopet Dagh, the nearly continuous highlands on the landward margin of the Caspian Coastlands; and the Ararat Mountains and Associated Hills and Basins, a rugged area of inland drainage in the northwestern part of the country just southeast of the high Armenian Knot.

(1) Caspian Coastlands. The northern coastlands of Iran skirt the southern shore of the Caspian Sea for about 400 miles, extending from the U. S. S. R. at Astara on the west to the Atrek River on the border of the U. S. S. R. in the east. The coastlands considered are those between

the water's edge (85 feet below sea level) and an ancient shoreline which, for most of its length, is marked by a line of terraces along the foothills of the Elburz Mountains. Generally, the plain is less than 10 miles wide, but becomes 20 to 25 miles wide at the mouths of the Safid, Gorgan and other rivers. Mt. Demavend, the highest (18,934 feet) of the lofty Elburz Range, is only about 50 miles from the Caspian Sea.

The beaches, except on the large delta areas, are hard sand and are bordered on the landward side by sand dunes. The plain between dunes and foothills varies in width from a mile or two in the west to as much as 20 miles in some areas farther east. The mid-section of the coastland may be reached from Teheran by three highways and one railway over the Elburz Mountains; each of the routes may become impassable during heavy winter snows.

The average annual rainfall and seasonal distribution of temperatures at Astara and Lenkoran are analogous to those of Portland, Ore., and Durham, N.C. (Table I). The mild rainy climate of the coastlands north of the Elburz Mountains is in remarkable contrast to the hot aridity of the south. Average January temperatures are well above freezing and average July temperatures are below 80°. The annual rainfall decreases from 53 inches in the west at Astara to 18 inches at Ashuradeh near the Soviet border on the east; most rain falls in autumn and winter but no season is dry. The high humidity (Fig. 6) and cloudy weather, together with the heavy, evenly distributed rainfall, impose problems of storage and shelter; clothing must provide wet-weather protection.

Much of the terrain is swampy, and protection against malaria and foot disease is important. Vegetation is so luxuriant and dense that passage through the forests and jungle growths is difficult. Lumber is available for construction and fuel.

The seasonal range and variability of temperature on the Caspian Coastlands require three clothing ensembles during the year (Table III). The lowest temperatures ever observed during the summer months at Lenkoran are May, 41°; June, 49°; July, 46°; August, 54°; and September, 46°. Thus, by September there may be need for a light sleeping bag (such as the Bag, Sleeping, Wool); rainfall is frequent and the ground is likely to be wet. A heavier bag may be needed by November, when temperatures are likely to go below freezing, although most of the cold weather clothing will not be needed until December. Likewise, the high autumn and winter rainfall and soggy ground make use of shoe-pacs advisable by late October or November.

(2) Elburz Mountains and Kopet Dagh. The Elburz Mountains, mantled in a luxuriant forest cover, rise abruptly at the landward edge of the narrow coastal plain to altitudes of 10,000 to 14,000 feet. Towering more than 4,000 feet higher, like ice-clad Mt. Rainier on the Cascades, is volcanic, snow-capped Mt. Demavend. Quite in contrast is the south

TABLE III: MILITARY CLOTHING FOR THE CASPIAN COASTLANDS

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Warm (above 68°)												
Cool (50° to 68°)												
Cold (14° to 50°)												

slope of the Elburz, brown with aridity. The descent southward toward the desert interior is relatively gentle, owing largely to the immense amounts of debris carried from the mountains by the many overloaded, disappearing streams.

The Kopet Dagh (mountains) on the far northeastern border of Iran are structurally in line with and a continuation of the Caucasus Mountains, on the other side of the Caspian Sea. In northeastern Iran, the subdued Elburz are folded in with the Kopet Dagh; together they stretch eastward to the ranges of the Hindu Kush in northern Afghanistan.

The Elburz Mountains are approximately in the latitude of the Sierra Nevadas of California, and like the Sierras are a little over 400 miles long and are humid on the seaward side and arid on the side of the elevated dry interior; unlike the Sierras, the Elburz trend east-west. In only a few places are the Elburz valleys deep enough and long enough to furnish satisfactory routes of travel. Two or three of these routes converge on the capital, Teheran, one skirting the base of the Demavend cone through Qau Pass at an altitude of 8,700 feet. Other and easier routes to the interior through the Elburz from the Caspian Sea are the Manjil Road in the west, following the valley of the Safid Rud to Bivarzin Pass (Fig. 7), and the Sharud-Guran Road in the east through Vaginanu Pass.

From the low desert sands of the Peski Kara Kum in U. S. S. R. (200 ft. to 400 ft.) the Kopet Dagh rise almost like a continuous wall, one of a series of parallel, rounded ridges averaging 6,000 feet to 8,000 feet in altitude. In marked contrast to the Elburz, the Kopet Dagh may be crossed almost anywhere on horseback. In winter these mountains are covered with snow, in spring they are clothed with lush grass, but in summer and autumn they are parched and brown. From the eastern edge of the Caspian Sea, the Kopet Dagh extend 400 miles southeastward to the border of Afghanistan, and for about half of this distance they constitute the Iran-Soviet boundary. In the valley of the Kashaf Rud between the two chief eastward-projecting prongs of the Kopet Dagh is the focal city of Meshed, the largest city and leading trade mart of northeastern Iran. This valley and city are accessible by way of several passes through the mountains.

The best index to the climate of the Elburz-Kopet mountains is the cover of natural vegetation. In the high Elburz, temperatures are lower

and precipitation is higher than in the Kopet Dagh in the east. Temperature and rainfall conditions in the northern margin of the Elburz Mountains are similar to those in southern Utah (St. George); those of the Kopet Dagh are similar to those in New Mexico (Albuquerque). The upper slopes of the Elburz have climatic features like those of the front ranges of the Rocky Mountains in southern Colorado and northern New Mexico. At Meshed, the air is calm seven-tenths of the time in April and nine-tenths in December; the light winds (average less than 2 mph) are, for the most part, northerly. On the average, only 23 days per year are rainy.

Months during which the various clothing groups are suitable in the Elburz Mountains region are shown in Table IV, based on temperatures at Teheran and Meshed.

Although very cold weather clothing as a whole is not indicated for the 4,500- to 7,000-foot level in Table IV, some of its component items may be needed in very cold winters: the average daily minimum temperature in January is 9°, and the extreme minimums are 14°F. or lower in each of the eight months from October to May (Table I).

(3) Ararat Mountains and Associated Hills and Basins. This region of mountains, plateaus, and basins is not quite as large as Utah, which it resembles in many respects; Lake Urmia is remarkably similar to Great Salt Lake in latitude, area, salinity, and elevation above sea level. The southern boundary of the region is the major drainage divide to the north of Kermanshah and Hamadan, and the northern margin is the Araxes (Aras) River on the U. S. S. R. border.

In the southeastern quarter of the Armenian Knot, the Ararat Mountains split into two lofty chains; the higher one extends southward in Turkey parallel to the Iranian border and the other reaches southeastward to the edge of the Caspian Sea where it merges with the Elburz Mountains. Most of the area between these two chains is a plateau between 5,000 and 8,000 feet in altitude. Several volcanic cones rise to majestic heights above the general level of this plateau. They include the Savalan Dagh (15,784 feet), Kuh-i-Sahand (12,172 feet) and, just over the boundary in Turkey, the renowned Mt. Ararat (16,916 feet).

TABLE IV: MILITARY CLOTHING FOR THE ELBURZ, ARARAT,
AND NORTHERN KURDISTAN MOUNTAINS

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

7,000 to 10,000 ft.

Cool (50° to 68°)

Cold (14° to 50°)

Very Cold (below 14°)

4,500 to 7,000 ft.

Cool (50° to 68°)

Cold (14° to 50°)

Below 4,500 ft.

Warm (above 68°)

Cool (50° to 68°)

Cold (14° to 50°)

The mountain wall on the boundary west of Lake Urmia is steep and deeply incised by swift-flowing streams. Only two good routes cross the frontier from this section; one leads from the south end of Lake Urmia over Gowre Shinki Pass to Mosul, the other is a section of the age-old highway skirting the south slope of the Elburz Range, entering Turkey just south of Mt. Ararat. Tabriz, the chief city of northwestern Iran, is on this important route (Fig. 8) and an adjacent railroad from Meshed through Teheran and Kazvin to the Soviet border. The highlands on the eastern border of the region between the U. S. S. R. and the Sefid Rud are known as the Talish Hills.

It may be inferred that all the plateau and mountainous sections of northwest Iran have cold winters and hot summers. Low rainfall is indicated by the semi-desert and steppe vegetation and by human activities limited chiefly to grazing except where irrigation water from mountain streams is available. Lake Urmia shrinks in summer and fall, due to low summer rainfall, and use of the mountain streams for irrigation.

At Tabriz (altitude 4,423 feet) near the center of the region, average January and February temperatures are far below freezing, 17° and 25°, respectively. The warmest month is August (81°). Although climatic data for this area, other than the monthly average temperatures at Tabriz, are scarce, a reasonable climatic analogue in the United States is the Bighorn Basin of northern Wyoming. At Basin, Wyo., with comparable encompassing mountains, only slightly (600 feet) lower, and with the range of average monthly temperatures nearly as great as that of Tabriz (Table I), the average maxima and minima in January are 29° and 2°, in July, 92° and 56°. The highest temperature in 27 years at Basin is 114°, the lowest -51°.

Temperature ranges and altitudes in the Ararat Mountain region are similar to those of the Elburz Mountains and the clothing needs are approximately the same (Table IV). Winter extremes of temperature, just as low in this region as in the Elburz Mountains, make the same special recommendations pertinent.

Figure 8: The road to Tabriz from Kazvin and Teheran, Nov. 1947. Similar desert-like badlands cover large sections of interior Iran. Aridity, blowing dust, poor water supply, and extreme temperatures hinder movement of troops and supplies.



b. Southern Division. The mountains that diverge from the Armenian Knot along the western boundary of Iran extend nearly 2,000 miles southeastward along the Mesopotamian Valley, the Persian Gulf, and the Gulf of Oman into Pakistan. This complex mountain chain is constricted in two places, north of the head of the Persian Gulf and north of the Strait of Hormuz, so that three curved ranges are formed: the Kurdistan (Zagros) Mountains, the Fars Ranges and Makran Ranges.

This mountain barrier varies in width from less than 50 miles at the narrowest constriction north of the Strait of Hormuz to more than 200 miles opposite the middle of the Persian Gulf. These two places where ranges coalesce provide relatively easy routes through the mountain barrier to the enclosed plateau of Iran.

(4) The Kurdistan (Zagros) Mountains are a part of the western festoon of ranges that project southeastward from the Armenian Knot, and include the area between the Shirvan and the Diz Rivers. Most of this region is within the drainage basin of the Saidmarreh River. The dozen or more parallel ridges rising to 10,000 feet or higher and the included drainage systems, except at higher altitudes, are similar topographically to the Ridge and Valley Region of Pennsylvania or Tennessee, but much drier. The Kurdistan Mountain region is about as large as the state of Maine.

The part of the Kurdistan Mountains in the Shirvan drainage basin is a high, broken, and deeply dissected platform 5,000 to 8,000 feet in altitude. The Saidmarreh and its tributaries, cutting through ridges and following parallel valleys, drain most of the area. Although the Saidmarreh is a large stream in its middle course, none of its waters reach the ocean; those which are not dissipated by evaporation and irrigation disappear in the marshes near the Persian Gulf. The foothills of the Kurdistan Mountains extend southwestward to the border of Iraq. The water from the small streams flowing from the foothills, like that of the Saidmarreh, disappears in the numerous alluvial fans and in adjacent marshes.

Erosion on the flanks of the Kurdistan ridges has exposed hundreds of ledges or rocks; many of them form high steep cliffs, and some which overhang may afford hillside shelters. The landforms are similar in many ways to those of the San Bernardino Mountains and Mojave Desert of Southern California.

High altitude and low precipitation are the major factors in the climate of the Kurdistan Mountains. The monthly distribution of temperature at Kermanshah (a little north of the center of the region) is similar to that of Dodge City, Kan. (Table I). Average maximum and minimum temperatures for January and July for the two stations are analogous, and the rainfall is also similar (each about 20 inches). One striking difference between the two is that Kermanshah (Table II) has two precipitation seasons (November-December and March-April), whereas Dodge City has only one (May-August).

The northern fourth of the Kurdistan Mountains has altitudes and seasonal temperatures similar to those of the Elburz Mountains, and the clothing shown in Table IV is suitable. However, for the southern three-fourths, in lower latitude and near the Mesopotamian Plains and Persian Gulf, less clothing is required (Table V).

TABLE V: MILITARY CLOTHING FOR THE SOUTHERN THREE-FOURTHS OF KURDISTAN MOUNTAINS, THE FARS MOUNTAINS, AND NORTHERN KERMAN RANGES

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<u>9,000 to 12,000 feet</u>												
Cool (50° to 68°)												
Cold (14° to 50°)												
<u>6,000 to 9,000 feet</u>												
Cool (50° to 68°)												
Cold (14° to 50°)												
<u>Below 6,000 feet</u>												
Warm (above 68°)												
Cool (50° to 68°)												
Cold (14° to 50°)												

At Kermanshah (altitude 4,860 feet), near the center of the Kurdistan Mountain region, the mean January temperature is 32°, the average daily minimum is 23°, and the extreme minimum is -8°. At 9,000 feet above sea level the corresponding temperatures would fall to 20°, 11°, and -20°, respectively; and at 12,000 feet altitude, above 10° lower.

(5) The Fars Mountains and Coastlands constitute the middle festoon of mountain ranges that lie between central Iran and the Persian Gulf. The region is about 600 miles long and, at its widest part, about 230 miles wide; its area approximates that of New Mexico.

Associated with the Fars Ranges are several basins of interior drainage, of which the Shiraz and Niriz basins are best known. The major trend of the Fars Ranges follows the curve of the Gulf shoreline in long parallel ridges; the large and small valleys conform in direction to the encompassing ranges, so that travel through the Fars Mountains follows the valleys and passes.

All the large rivers flow into the Persian Gulf or adjacent marshes from headwaters near the interior margin of the highlands. They include the Karun, which drains the mountains of the northwest; the Zuhreh and Mond, which flow out of the middle; and the Mehran and the Shur, which emerge from the mountains in the southeast.

This region may be divided into three sections: foothills (20 percent); large interior basins (10 percent); and mountain ranges and valleys (70 percent).

The foothill country between the mountains on the northeast and the delta and coastal plains, is over 500 miles long and as much as 40 miles wide, and has a variety of rocky terrain. Extensive petroleum deposits are exploited adjacent to the delta plains. Groups of denuded, rounded limestone ridges are said to look like herds of "basking whales" in the glaring sunlight. In the southeast, associated with the mountains and foothills, are dozens of high salt domes.

In latitude, terrain, and climate, the part of this region which borders the Persian Gulf is surprisingly similar to the Sierra Madre Ranges and Sonoran Desert area of Mexico east of the Gulf of California. For example, Bushire on the Persian Gulf Coast has a climate much like that of Guaymas, Mexico, on the Gulf of the California coast. On the Persian Gulf Coast, the relative humidity is high throughout the hot summer, even in the daytime. It drops rapidly, however, a few miles inland and also with small increases in altitude.

Although few climatic data concerning the Fars Mountains are available, especially in the western two-thirds, the limited records at Deh Bid and Shiraz are strikingly similar to the records of Flagstaff and Tombstone, Ariz., even though the Iranian stations are somewhat higher. The highway from Bushire (14 feet above sea level) reaches 473 miles across the Fars Mountains to Isfahan (5,817 feet above sea level), ascending to 5,000 feet at Shiraz in the first 182 miles; at Quli Kash Pass near Deh Bid the road is nearly 7,500 feet above sea level. A trip inland from Guaymas, Mexico, across the Sonoran Desert and Western Sierra Madre Mountains to the Mexican Plateau would be comparable in many ways to the Bushire-Isfahan journey.

The contrasts in altitude and exposure to marine influences account in large measure for differences in clothing requirements in the Fars Mountains and Coastlands. Clothing requirements in the highland are similar to those of the Kurdistan Mountains (Table V); those for lowland sections are shown in Table VI.

TABLE VI: MILITARY CLOTHING FOR KHUZISTAN PLAIN, THE FARS COASTLANDS, AND THE MAKRAK COAST

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Warm (above 68°F.)												
Cool (50°F. to 68°F.)												

Keeping cool is a major problem on the coastlands. At Bushire the average daily minimum for July is 84.4°F., and 74° is the lowest July reading on record. Associated with the high temperatures is the high atmospheric humidity but entire lack of rainfall in summer: Bushire on the average has no rainfall at all from July through September (Table II).

(6) Makran Range and Coastlands. Of the three mountain ranges in southern Iran, the Makran Ranges are farthest east. They border the Gulf of Oman and extend into Pakistan where they join the north-south Kirthan Ranges. Across the Gulf of Oman, in Arabia, the ranges of Western Hajar are parallel to the Makran Ranges.

The Makran Mountains are less rugged than the ranges farther west; in general, the rivers are winding and flow only in winter. Adjacent to the Strait of Hormuz, the alignment of ridges is north-south, changing abruptly to an east-west trend in the vicinity of Jask. Near Jask, and at several other places along the coast, prongs of the Makran Ranges extend southward to the water's edge. On the northern margin of the region, are the Kuh-i-Bashagird, reaching altitudes of 5,000 to 7,000 feet. Much of the interior is a dissected plateau presenting many fantastic erosional features similar to those of Bryce Canyon in southern Utah and the Big Badlands of western South Dakota.

The 300 miles of coastal plain, one to twenty miles wide, are dry and unattractive. Most of the rivers flow intermittently or dry up before they reach the coast. The few inhabitants of the small coastal oases depend on fish for most of their food. The river valleys afford poor roadways to the unproductive interior.

Frost is unknown along the Gulf of Oman coast. At Jask the mean daily minimum temperature in January is 60°; the mean daily maximum in July is 96°. In the interior, the range between the extremes of temperature probably is greater. Climate, coastlands, and terrain are similar to those of Lower California and the Sonoran coast of Mexico. Climatic conditions at Jask are fairly representative of the Makran coast (Tables I and II); La Paz, in Lower California, is a good American analogue.

Along the warm Makran coast the same clothing is required as along the Fars coast (Table VI). In the Makran Ranges, at higher altitudes and farther from the sea, temperatures are lower and clothing requirements are greater (Table VII).

TABLE VII: MILITARY CLOTHING FOR THE MAKRAN RANGES, THE KERMAN SOUTHERN RANGES, AND THE KHURASAN DESERT BASIN

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Warm (Above 68°)												
Cool (50° to 68°)												
Cold (14° to 50°)												

(7) The Khuzistan Plain, a portion of the lower end of the Mesopotamian Valley, lies between the foothills of the Fars Ranges and the Persian Gulf, and is somewhat larger than Imperial Valley in California. The soil is composed mostly of clays and silts deposited in the

north end of the Gulf by several lazy, meandering rivers; the Karkheh, Marun, Diz, Karun, and Zuhra. The first two of these do not reach the sea, but disappear in the deltaic marshes. A low well-drained north-south ridge, flanked by swamps, crosses the middle of the plain and furnishes good highway and railway routes from the head of the Gulf to the interior.

Khurramshahr, 40 miles from the Persian Gulf, is the head of navigation for ocean-going vessels, a leading date-exporting city, and the seaward terminus of the Trans-Iranian railway to Teheran. Abadan, about a dozen miles downstream from Khurramshahr, is a petroleum pipe line terminus and has the largest oil refinery in the world, products from which are distributed widely over southern and western Europe.

The climate on the Khuzistan Plain is analogous to that of Yuma, Arizona (Table I). Average July daily maximum temperatures are well above 100°, and extreme temperatures over 120° have been recorded.

At Abadan during the summer of 1944, the highest temperature recorded was 122°, and on 60 of the 92 days it was 110° or higher, the following summer, the highest temperatures was only 118°, but 56 days had readings of 110°, or higher. The hottest temperatures at Abadan are higher than those at places on the immediate coast, such as Jask and Bushire, farther to the southeast; still higher temperatures occur farther inland, as at Andimishk, at the extreme northern end of the plain, where 123° was observed in 1944, and the temperature was 110° or over on 87 of the 92 days.

The "shamal", prevalent northwest summer wind, frequently stirs up severe dust storms which add to the discomfort of high temperatures. Strong winds from the interior sometimes lower temperatures below freezing in winter. A small amount of rain (4 to 6 inches) falls in winter, but in summer, especially from May to September, the whole plain is torrid and sunbaked. In late winter and spring the landscape is green and refreshing, but July all is sear and brown except plantations and orchards; flocks are moved from the parched plain to mountain pastures. After the winter rains, much of the more or less swampy sections is largely nontrafficable.

Clothing requirements of this section are shown in Table VI. In the vicinity of rivers and fresh water marshes, mosquitoes are prevalent and precautions relative to malaria are important. Scarcity of good drinking water in much of the Khuzistan Plain is a severe restraint on permanent settlement. Khurramshahr, at the junction of the Shatt-al-Arab and Karun, secures fresh water from the former river at ebb tide.

c. Central Division. The interior of Iran is mostly desert, encompassed by mountains on all sides. It has roughly the form of a right triangle with the right angle in the northeast, and the hypotenuse, nearly 1,000 miles long, along the base of the adjacent Kurdistan and Fars

mountain ranges (Fig. 8). On the north are the ranges of the Elburz and Kopet, and on the east the countries of Afghanistan and Pakistan.

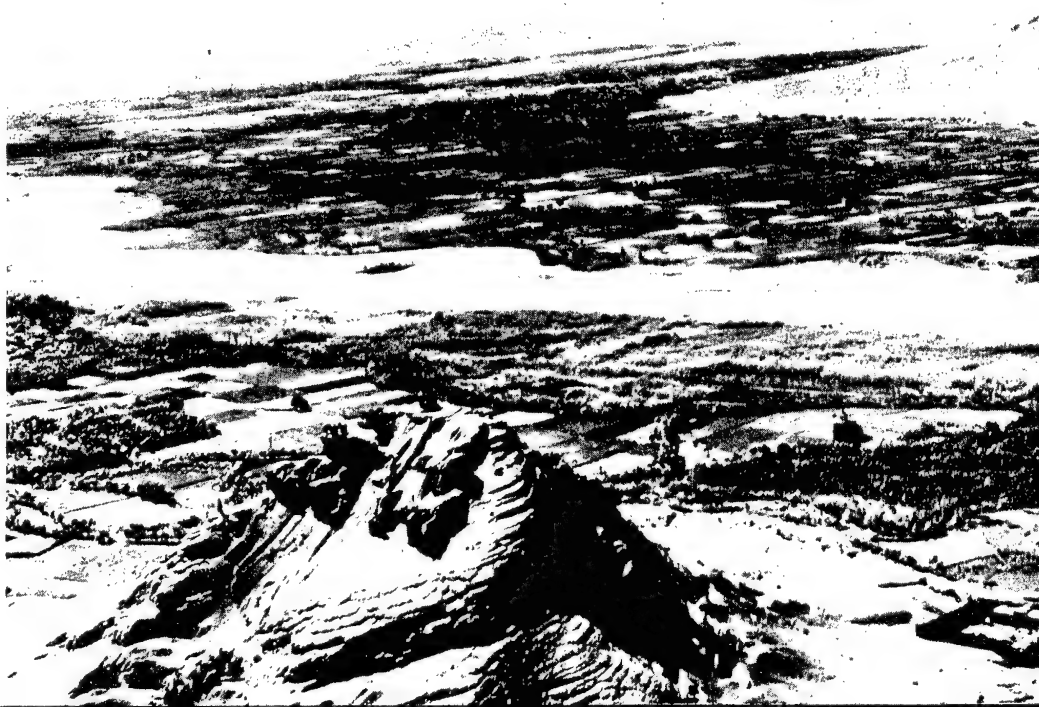
Great deserts are among the world's most severe barriers to land travel. The mountain-girt deserts of Iran are good examples. As a section of the Central Eurasian Barrier (Fig. 1), Iran is more effective because of its great deserts than its great mountains. Almost half of Iran drains into interior salt lakes and salt basins which, a few thousand years ago when this part of the world was much more humid, were full of water. Centuries of low rainfall have dried the large interior lakes into a series of desolate and forbidding salt flats.

Yet not all of Central Iran is a desolate waste. Intensive agriculture in small areas where irrigation is possible supports relatively dense populations, and large cities have grown up in these areas, notably the Iranian capital, Teheran, on the northern edge of the interior basin division.

The Central Division is somewhat smaller than Texas, with which it corresponds in latitude. Most of it is between 3,000 and 7,000 feet in altitude, with numerous small tracts above 10,000 feet. Three regions are delineated within this part of Iran: The Kerman Ranges and Associated Basins on the south, the Khurasan-Taftan Ranges along the eastern border, and the Khurasan Desert Basin, in the center and north.

(8) Kerman Ranges and Associated Basins. Extending nearly 1,000 miles southeastward from the drainage basin of the Quzil Usum is a succession of mountain chains, basins, and valleys, all trending northwest-southeast. The large valleys and basins are, for the most part,

Figure 9: Irrigation is intensive along the streams which emerge from mountains and meander through wide valleys into the dry basins of the plateau of Iran. (View of Marash Rock 2 miles west of Isfahan, May 1936).



adjacent to the Kurdistan, Fars, and Makran Mountains. The broad mass of Kerman Ranges in the southeast part of the area narrows northwestward to a long series of central Iranian chains which reach beyond the city of Hamadan.

The larger salt basins of the region are between the ranges, which are 30 to 40 miles apart. In most cases, immense quantities of debris transported into the intermontane basins now cover the margins of the salt flats. On many of these alluvial fans are oases supporting numerous villages and even some cities of considerable size. Some of the intermontane basins are large, such as the Jaz Murian (50,000 sq. mi.) in the southeast, surrounded by mountains with some peaks 12,000 to 14,000 feet high. Other large basins are in the vicinity of Isfahan (Fig. 9) and Siryan (Sa'idabad). Travel through this part of Iran would be similar to a trip through the basin and range region from Salt Lake City, Utah, to Reno, Nevada.

The climates of Isfahan (5,817 feet) and Kerman (6,100 feet) resemble those of Alamo, in south central Nevada, and Douglas, in the southeast corner of Arizona, respectively (Table I). Much of this region is higher than these weather stations, although some of the basins are considerably lower: most of the Jaz Murian depression is less than 2,000 feet above sea level. The whole region is arid: Isfahan and Kerman each receive less than six inches of rainfall annually, most of it in winter (Table II).

Contrasts in altitude and differences in latitude put clothing requirements into two classes. Table V applies to the northern two-thirds of the Kerman Ranges and Associated Basins, and Table VII to the southern one-third of the region.

The temperature ranges at Kerman are closely associated with the clothing differentials shown in Clothing Tables V and VII. The January average daily minimum is 29°, but at 9,000 and 12,000 feet is about 19° and 10°, respectively. The lowest temperature observed in January at Kerman was 7°, and at the 9,000- and 12,000-foot levels temperatures may fall below 0°. In contrast, the valley and basin sections become extremely warm in summer and not so cold in winter.

(9) Khurasan-Taftan Ranges and Frontier Basins. This part of Iran is about as big as Utah, but it is much longer -- as far as the distance from Salt Lake City, Utah, to Phoenix, Ariz. The eastern boundary of Iran with Afghanistan and Pakistan follows some well defined transverse features on the Iranian plateau. North-south mountains cross near the middle of the plateau, and the political boundary for the most part follows either the lowlands at the base of the mountains or the crest of the easternmost ridge.

The Khurasan-Taftan Ranges and Frontier Basins naturally fall into two sections. In the first section, the Khurasan Ranges in the north

join with the Taftan Ranges in the south and the Siahan Ranges in Pakistan to form a great mountain arc around a portion of the eastern half of the Iranian Plateau. In the second section, a series of basins nestles at the inner margin (eastern and northern slopes) of the mountain arc, the largest of which receives drainage water from the mountains of northeastern Afghanistan.

The easternmost part of the Khurasan Ranges (5,000 to 7,000 feet) is highest, and consequently the drainage is mostly toward the west. The abrupt descent on the eastern slopes resembles that of the eastern slope of the Sierra Nevadas of California. The northern part of the Taftan range area is rugged and deeply dissected; the middle section is a plateau-like surface studded by some spectacular volcanic peaks among which is the beautiful cone of Kuh-i-Taftan (13,034 feet) towering above a large group of disintegrating volcanic cones. The southern section of the Taftan area is composed of about a half dozen ridges that diverge from the mountain core to the southeast and east, toward Pakistan and the valley of the Mashkel Rud.

The northeast boundary of Iran is the channel of the Hari Rud. South of the Hari Rud is a series of large basins of inland drainage. There are numerous isolated buttes and monadnocks in the central basin area -- remnants of an ancient geological landscape which now lies almost entirely buried under the detritus carried in by the rivers from the surrounding highlands. Similar landforms may be seen in the Great Basin in Nevada and the Mojave Desert in California.

The most important depression is the renowned Seistan Basin which from time immemorial has loomed large in trade, travel, history, literature, and mythology. Today an important north-south caravan and motor route traverses this region from Chahbar (Chāh-e-Bahār) on the coast of the Gulf of Oman to Ashkhabad in Russian Turkestan; Bampur, Zahidan, and Meshed are leading intermediate stations. An east-west motor and caravan route crosses the southern tip of the region to Zahidan near the Pakistan border; this ancient route is paralleled by a railroad to Quetta and the Indus Valley.

The climate of Sarakhs (984 feet), on the border of U. S. S. R. in the valley of the Hari Rud just outside the northern boundary of the region is similar to that around Albuquerque, N. M., with the altitude somewhat lower and summer temperature higher at the Iranian station. Zahidan (4,718 feet) in the middle of the region near the Afghan border, is similar to Columbus, in southwestern New Mexico. Average temperatures and precipitation analogous to those in the Mashkel Basin in the south, as shown by climatic records at the nearby station of Panjgur in Pakistan, are found at Barstow, California. At Panjgur (3,177 feet), the January daily minimum temperature is 38°F, but temperatures frequently drop below 32°F: the average July daily maximum is 103°F. At the southeast Iranian stations the annual rainfall ranges from 1.7 inches at Seistan (2,000 feet) to 7.0 inches at Sarakhs -- comparable to that of Barstow, California (4.0 inches) in the Mojave Desert.

Climatic conditions result in the development of a grazing and irrigation economy. Some of the short streams that flow down from the mountain slopes support small oases on the alluvial fans on the margins of the associated basins.

Clothing needs for this region are outlined in Tables V, for the mountains, and VII, for the basin sections. About 80 percent of the highland section is below 6,000 feet, 20 percent between 6,000 and 9,000 feet, and an insignificant area between 9,000 and 12,000 feet. In January the mean temperature at Zahidan is 41°, the average daily minimum 28°, and the extreme minimum 10°. At altitudes of 9,000 and 12,000 feet temperatures are 14° to 21° lower, sometimes reaching below 0°. Other factors affecting the comfort of combat troops, especially in the basin sections, are associated with aridity: blowing sand, dust, and glaring sunlight.

(10) Khurasan Desert Basins. From the headwaters of the Rud-i-Shur 100 miles west of Teheran, the Khurasan Desert Basins extend southeastward for about 800 miles and include terrain as desolate and climate as severely arid as may be found anywhere.

A thin surface of encrusted salt, floating on a viscous subsurface of slimy mud, added to the forbidding terrain and climate of Death Valley, California, gives an impression of conditions of the thousands of square miles of "kavirs" of Iran. These salt-encrusted kavirs do not dominate the landscape as a whole, for at least three-fourths of the region is characterized by sand and gravel plains, sand dunes, desolate mountain wastes and severely eroded badlands.

The northern three-fifths of the Khurasan Basin contains most of the salt-encrusted land, and is associated with the Dasht-i-Kavir. The landscape of the southeastern two-fifths, known as the Southern Lut, is dominated by extensive dunes, numerous buttes and mesas, fantastic badlands, and smaller but even more treacherous kavirs.

Routes of travel avoid the kavirs, usually skirting the marginal highland or following the low divides between the lakes and salt flats. A railway runs from Meshed along the north margin to Tabriz by way of Teheran, and another from the Persian Gulf coast crosses the west end of the region to Teheran by way of Qum. Motor roads of highly variable quality entirely encircle the region. Only camel caravans venture to cross the desert interior; movement is precarious during the desert storms.

From records at Teheran, on the northern margin, and at Seistan, outside the region but at a corresponding altitude in the south, together with reports of travelers and the status of human occupancy in various quarters of the region, some climatic inferences may be drawn. North, west, and south of Teheran, especially on the watersheds of the Rud-i-Shur and Qara Chai, snow covers the mountains in winter. Together



Figure 10: Irrigated area along Rud-i-Shur southwest of Teheran. Similar densely cultivated and thickly settled areas are found along water courses of the Iranian plateau, which otherwise is a barren hot desert.

with the light winter rainfall on the plateau, and the spring-fed streams, this snow furnishes irrigation water for numerous oases (Fig. 10). Similar conditions prevail also on the eastern margin of the region in the foothills of the Khurasan and Taftan Ranges.

The Southern Lut is one of the intensely hot parts of the earth; some sections are less than 1,000 feet above sea level. Here, and in the vicinity of Seistan, the hot desiccating blasts of the "Wind of 120 days" reach 70 miles per hour, creating a pandemonium of noise, sand, and dust. Lifeless desolation reigns supreme for hundreds of miles in the Southern Lut.

Greenland Ranch, California (178 feet below sea level), in Death Valley, may be used as a climatic analog for much of the Khurasan Desert Basin region, especially for the Southern Lut. At Greenland Ranch the average January temperature is 51°, and the average daily maximum and minimum are 65° and 37°, respectively. The corresponding measures for July are 102°, 116°, and 88°. The extreme maxima at Greenland Ranch range from 85° in January to 127° in July (an "official" value of 134° is questionable); extremes in the Southern Lut probably exceed these values. The average annual rainfall at Greenland Ranch is 1.5 inches, ranging from 4.5 inches in 1912 to none in 1929, and similar conditions undoubtedly prevail over much of the Khurasan Desert Basin. At Teheran, in the northern part of the Khurasan Desert, temperature extremes range from -5°F. in January to 109° in July.

3. Clothing

Requirements for military clothing for the ten regions of Iran have

been summarized, in Tables III through VII of the preceding section according to four groups of clothing. Items which make up these groups are listed in Tables VIII through XI, according to two categories of soldiers. Those of Class A, B, and C are generally so mobile or so engaged that housing is usually not available; they must have clothing adequate for 24-hour living outdoors. Those of Class D and E units normally work and live at airfields or other semi-permanent installations where housing is provided and thus do not require as complete protection from their clothing.

These tables show, in the "Wear" column, only as much clothing as can be worn at one time, and in the "Spare" column the minimum changes and replacements to be carried by the soldier. In general, the clothing shown in these tables is considered the adequate minimum for one season's successful operation, although frequent replacement of footgear may be needed. No equipment is listed, except for helmets and sun glasses; with very cold weather clothing in particular, and in rugged mountains at all seasons, specialized mountaineering equipment may be needed. Details on the function of various footgear items are given in Figure 11.

a. Warm Weather Clothing (Table VIII) is required from 9 to 11 months along the southern coast, but only 3 to 5 months or less in much of the highland areas. At Jask, the mean January temperature is 67° (Table I), and the mean daily minimum temperature is 60°; the mean July temperature is 91°. These temperatures indicate the variability of conditions wherein Warm Weather Clothing is expected to keep a combat soldier comfortable. At Teheran in May the mean temperature is 70°, but the mean daily minimum is 47° and similar conditions prevail in September and October. Warm sleeping equipment (Bag, sleeping, wool) is needed in May (kept over one month from the Cool Weather Clothing), and September (early issue at the onset of the cool season).

Footgear on the plateau and foothills, where some of the terrain is rocky and some is impregnated with salts and alkali, is subject to rapid deterioration either by abrasion or chemical action, and frequent replacement is likely to be necessary.

In all parts of Iran summer is dry and the sky nearly cloudless much of the time. The need for protection of eyes from sun glare is great, and wind renders further protection necessary. Goggles and sun glasses both are recommended; dust respirators may be needed during dust storms. During long exposure to the desert summer sun, the Arab headdress, or neck cloths attached to the cap, may be used to protect the neck from excessive sunburn. The Arab headdress has the added advantage that the cloth can be pulled around in front of the face during dust storms.

b. Cool Weather Clothing (Table IX) is indicated for several months in all parts of Iran, even high in the mountains. Along the southern coast these months are from December through March, but in

U.S. ARMY COMBAT FOOTGEAR

ITEM	WEIGHT PER PAIR	SOCKGEAR	FUNCTION	SURFACE	RANGE OF ACTUAL AIR TEMPERATURES FOR SATISFACTORY USE (Ground Surface Temperatures May Be as Much as 40°F° Warmer or Colder.)	T/A 21 ZONES						
						I	II	III	IV	V	VI	VII
BOOT, COMBAT, TROPICAL	3.88 lbs. Leather Nylon Duck Leather Rubber	1 pr. socks, wool, cushion sole 1 pr. insoles, ventilating Total: 0.29 lbs.	Provides Traction Permits sweat evaporation & ventilation Quick drying	Forests, jungles & grasslands under tropic & semitropic conditions	-58 to -40 -32 -22 -14 -5 -13 -19 -27 -35 -43 -51 -59							
BOOT, SERVICE, COMBAT, RUSSET	3.88 lbs. Leather Rubber	1 pr. socks, wool, cushion sole Total: 0.19 lbs.	General use	Generally dry surfaces under temperate conditions	-58 to -40 -32 -22 -14 -5 -13 -19 -27 -35 -43 -51 -59							
BOOT, COMBAT, RUBBER, INSULATED	5.50 lbs. Rubber	THIS ITEM STANDARDIZED 27 JUNE 1951 TO REPLACE SHOEPAK 12-INCH M-1944 WHICH BECAME SUBSTITUTE STANDARD 1 pr. socks, wool, cushion sole Total: 0.19 lbs.	Provides traction Waterproof Skis & Snowshoes	Wet & water-logged surfaces under wet-cold conditions	-49 -31 -13 -5 -13 -19 -27 -35 -43 -51 -59							
BOOT, SKI-MOUNTAIN	5.30 lbs. Leather Rubber	1 pr. socks, wool, cushion sole 2 pr. socks, wool, ski 1 pr. insoles, felt Total: 1.05 lbs.	Abrasion protection Supports foot & ankle Provides traction Skis & Snowshoes	Rugged mountain or snow-covered surfaces For special troops only	-58 to -40 -32 -22 -14 -5 -13 -19 -27 -35 -43 -51 -59							
BOOT, ARCTIC, FELT	3.63 lbs. Canvas Leather Felt Rubber	1 pr. socks, wool, cushion sole 2 pr. socks, wool, ski 1 pr. insoles, felt Total: 1.05 lbs.	Permits sweat evaporation Supports foot & ankle Cuff excludes snow Skis & Snowshoes	Dry snow & bare ground under arctic conditions	-49 -31 -13 -5 -13 -19 -27 -35 -43 -51 -59							
BOOT, MUKLUK	2.99 lbs. Canvas Rubber	1 pr. socks, wool, cushion sole 2 pr. socks, wool, ski 1 pr. socks, felt 2 pr. insoles, felt Total: 2.04 lbs.	Flexible sole permits self-warming of foot Canvas permits sweat evaporation Calf-length excludes snow Skis & Snowshoes	Dry snow & bare ground under arctic conditions	-58 to -40 -32 -22 -14 -5 -13 -19 -27 -35 -43 -51 -59							

the high mountains of both the north and south from April or May through September. In all other parts of the country, the Cool Weather Clothing is needed in spring and autumn. During unseasonably warm or cold weather, and in periods of change-over, items from the warm weather or cold weather ensembles will be needed; for example, the Shirt, knit, od, the Jacket, wool, od, and the Sweater, high neck.

The rainy season for most parts of Iran synchronizes with the wearing of Cool Weather Clothing. At Astara on the Caspian Coastland more than 20 inches of rain falls in October, November, and December, and nearly half of the days are rainy. Corresponding conditions occur in Kermanshah (Kurdistan Mountain region) and Meshed (Elburz Mountain region) in spring (March through May), but with much less rainfall than at Astara, and only 3 to 5 rainy days per month.

The heavy rainfall along the Caspian coast from September through December together with much low, swampy terrain indicates that Boots, knee wader should be available. In the interior, the rugged terrain, the areas of wind swept rocks, and the alkali impregnated soils will require frequent replacement of combat boots.

c. Cold Weather Clothing (Table X) is used in all parts of Iran except the southern delta and coastlands during winter.

Nowhere in Iran do temperatures approach the lower limits of body protection afforded by the Cold Weather Clothing except in the higher altitudes (above 4,500 feet in the northern mountains, and 6,000 feet in the southern mountains). Winter is the rainy season throughout Iran, although the average annual precipitation over most of the country is less than 10 inches.

TABLE VIII: WARM WEATHER CLOTHING FOR IRAN
(Average Monthly Temperatures above 68°F)

<u>Class A, B, & C Troops</u>	<u>Wear</u>	<u>Spare</u>
Undershirt & Drawers, cotton, od	1	2
Shirt, knit, od	1	-
Jacket & Trousers, lightweight or herringbone twill	1	1
Belt, waist, web	1	-
Poncho, lightweight, od	1	-
Cap, herringbone twill	1	-
Glasses, sun, w/case	1	-
Helmet, steel, complete	1	-
Socks, wool, cushion sole	1	2
Boots, service, combat, russet	1	1
Blanket, wool, od	1	-
Anti-insect items	1	-

Class D & E Troops

Essentially the same as for A, B, & C: the following substitutions or additions may be made:

Jacket, field, od, (in lieu of Shirt, knit, od)	1	-
Raincoat, (in lieu of Poncho)	1	-
Shirt & Trousers, cotton, khaki	1	2

At the time of the onset of the cold season, bursts of cold weather make the early issue of Jacket, wool, od and Cap, field, cotton, od, w/visor desirable.

Because of low swampy terrain (below sea level) and high winter rainfall, shoes are recommended for winter use by combat troops on the southwest Caspian Coastland. In and around the interior salt and alkali basins, footgear deterioration is rapid and frequent replacements must be available.

TABLE IX: COOL WEATHER CLOTHING FOR IRAN
(Average Monthly Temperatures 50 to 68°F)

Class A, B, & C Troops

Wear Spare

Undershirt, & Drawers, cotton, od	1	2
Shirt, flannel, od	1	1
Trousers, field, wool, od	1	1
Trousers, field, cotton, od	1	-
Suspenders, trousers	1	-
Sweater, high neck	1	-
Jacket, field	1	-
Poncho, lightweight, od	1	-
Cap, field, cotton, od, w/visor	1	-
Hood, jacket & overcoat	1	-
Helmet, steel, complete	1	-
Glove-inserts, wool	1	1
Glove-shells, leather	1	-
Socks, wool, cushion-sole	1	2
Boots, service, combat, russet	1	-
Boots, knee-wader (in wet areas only)	1	-
Bag, sleeping, wool	1	-
Case, water repellent, bag, sleeping	1	-

Class D & E Troops

Essentially the same as for A, B, & C; the following substitutions or additions may be made:

Jacket, wool, od (in lieu of Sweater, high neck)	1	-
Raincoat (in lieu of Poncho)	1	-
Jacket & Trousers, herringbone twill	1	1
Cap, herringbone twill	1	-
Belt, waist, web (with Trousers, herringbone twill)	1	-
Blanket, wool, od (in lieu of Bag, sleeping, wool & case)	2	-

TABLE X: COLD WEATHER CLOTHING FOR IRAN
(Average Monthly Temperatures 14 to 50°F)

<u>Class A, B, & C Troops</u>	<u>Wear</u>	<u>Spare</u>
Undershirt & Drawers, cotton, od	1	2
Undershirt & Drawers, winter	1	1
Shirt, flannel, od	1	1
Trousers, field, wool, od	1	1
Trousers, field, cotton, od	1	1
Suspenders, trousers	1	-
Sweater, high neck	1	-
Jacket, field	1	-
Jacket, field, pile, od	1	-
Poncho, lightweight, od	1	-
Parka & Trousers, field, overwhite (in snowy areas only) . . .	1	-
Cap, field, cotton, od, w/visor	1	-
Helmet, steel, complete	1	-
Hood, jacket & overcoat	1	-
Muffler, wool, od	1	-
Glasses, sun, w/case	1	-
Mitten-inserts, trigger finger	1	1
Mitten-shells, trigger finger	1	-
Mittens, overwhite (in snowy areas only)	1	-
Socks, wool, ski	2	4
Insoles, felt	1	1
Shoepacs, 12-inch	1	-
Bag, sleeping, mountain	1	-
Case, water repellent, bag, sleeping	1	-

Class D & E Troops

Essentially the same as for A, B, and C; the following substitutions or additions may be made:

Jacket, wool, od	1	1
Overcoat, wool, od (in lieu of Jacket, field, pile) . . .	1	-
Cap, field, pile, od (drivers, etc., only) (in lieu of Cap, field, cotton)	1	-
Boots, service, combat, russet (in lieu of Shoepacs) . . .	1	-
Overshoes, Arctic (with Boots, service, combat, russet) . . .	1	-
Socks, wool, cushion sole (with Boots only) (in lieu of Socks, wool, ski)	1	2
Blankets, wool, od (in lieu of Bag, sleeping and case) . .	2	-

TABLE XI: VERY COLD WEATHER CLOTHING FOR IRAN
(Average Monthly Temperatures Below 14°F),

<u>Class A, B, & C Troops</u>	<u>Wear</u>	<u>Spare</u>
Undershirt & Drawers, cotton, od	1	2
Undershirt & Drawers, winter	1	1
Shirt, flannel, od	1	1
Trousers, field, wool, od	1	1
Trousers, field, cotton, od	1	1
Suspenders, trousers	1	-
Sweater, high neck	1	-
Jacket, field, pile	1	-
Parka-liner, pile, & Parka-shell, cotton, M-1948	1	-
Parka & Trousers, field, overwhite	1	-
Poncho, lightweight, od	1	-
Cap, field, cotton, od, w/visor	1	-
Helmet, steel, complete	1	-
Mask, cheek protector, Arctic	1	-
Muffler, wool, od	1	-
Glasses, sun, w/case	1	-
Mitten-inserts, trigger-finger	1	1
Mittens, Arctic	1	-
Mittens, overwhite	1	-
Socks, wool, cushion-sole	1	2
Socks, wool, ski	2	4
Boots, Arctic, felt (except in deep snow)	1	-
Boots, mukluk (in areas of deep snow only)	1	-
Socks, felt (with Boots, mukluk, only)	1	1
Insoles, felt (4 pairs needed with Boots, mukluk)	1	1
Bag, sleeping, Arctic	1	-
Case, water repellent, bag, sleeping	1	-
Mountaineering equipment (skis, ropes, axes, etc.)	1	-

Class D & E Troops

Essentially the same for A, B, and C; the following substitutions or additions may be made:

Jacket, wool, od (in lieu of Sweater, high neck)	1	-
Parka & Trousers, field, overwhite	May not be needed	
Cap, field, pile, od (in lieu of Cap, field, cotton)	1	-
Mask, cheek protector, Arctic	May not be needed	
Mittens, overwhite	May not be needed	
Shoepacs, 12-inch (in lieu of Boots, Arctic, felt)	1	-
Socks, wool, cushion-sole	Not needed with Shoepacs	

d. Very Cold Weather Clothing (Table XI) is recommended for use in winter in Iran only at high altitudes (above 4,500 feet) in the mountains of the north. Combat troops operating in this area should be provided with Very Cold Weather Clothing in December so as to be ready for any unseasonable severe weather. Specialized mountaineering equipment (skis, snowshoes, ropes, axes, pitons, crampons, etc.) probably will be needed.

e. Items recently standardized gradually will replace in the supply lines several of the items listed above. All listings in the summary tables (Tables VIII through XI) are those authorized by T/A 21 (Mbl) at the time of preparation of this report. Table XII indicates some replacements applicable to Iran.

TABLE XII: CLOTHING REPLACEMENT

(S means Standard; L, Limited Standard; B, Substitute Standard)

<u>Items in Summary Tables</u>	<u>Replacement Items</u>
Shirt, flannel, od (B)) Sweater, high neck (B)) . . .	Shirt, field, wool (S)
Jacket, field (L) w/hood, jacket and overcoat (S) . . .	Jacket, field, w/o liner, (S) w/hood, jacket and overcoat (S)
Jacket, field, pile, od (B)	(Liner, jacket, field, frieze (S)* (Liner, jacket, field, wool (B)*
Trousers, field, cotton, od (L) . . .	Trousers, field, cotton, M-1950 (S)
Parka & Trousers, field, overwhite (L).	Parka & Trousers, field, overwhite, M-1950 (S)
Mittens, overwhite (L)	Mittens, overwhite, M-1950 (S)
Overcoat, wool, od (D)	Overcoat, cotton, od 7, w/remov- able wool liner (S)
Parka-liner, pile & Parka-shell, . . . cotton, od (L)	(Parka-shell, M-1951 (S) (Parka-liner, M-1951 (S) (Hood, Parka, M-1951 (S)
Shoepacs, 12-in.(B) w/2 pr. socks . . wool, ski; 1 pr. insoles, felt . . .	Boots, combat, rubber, insulated, (S) w/1 pr. socks, wool, cushion sole

*Either jacket liner can be used with Jacket, field, w/o liner (S), or with the Jacket, field, M-1950 (L), but neither can be used with Jacket, field, M-1943 (L).

4. Shelter and Storage

Tents for the shelter of troops, and outside storage of supplies, are satisfactory throughout the year over almost all of Iran, with certain necessary precautions against temperature extremes, precipitation, and wind. Existing buildings large and strong enough for military use are few, and most native quarters are generally not desirable because of insects (discussed in the next section) and other problems.

a. Summer. Hot dry winds, wind-blown sand and shifting sand dunes, and intense sunshine make summertime protection for troops and supplies desirable. Except around the Caspian Sea and high in the mountains, temperatures over 100° are likely throughout the summer, and readings over 120° must be expected along the Persian Gulf coast and in the interior deserts.

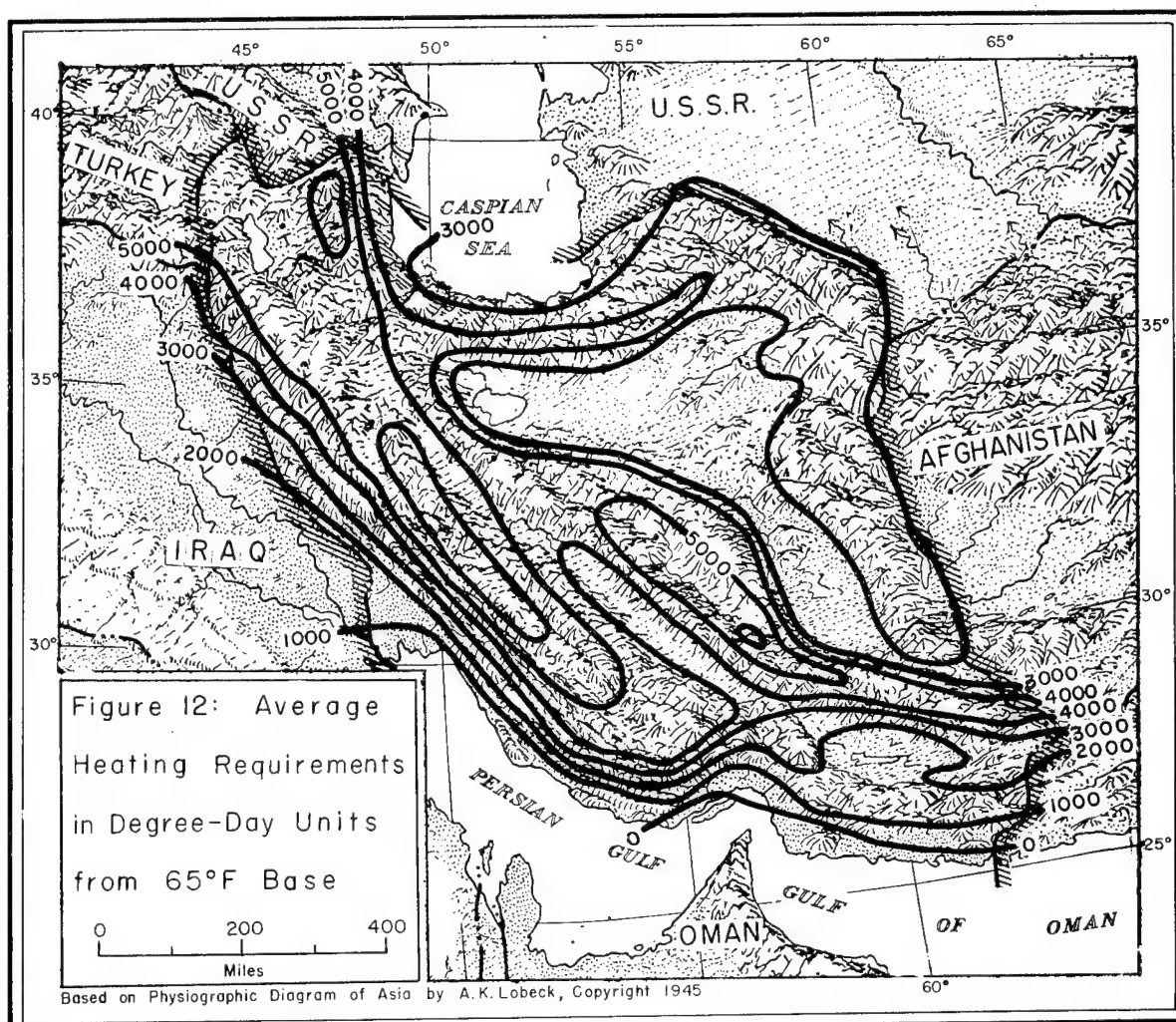
Tents should have large flies to shade them; flies prevent tent roofs from being heated above the air temperature, and increase markedly the protection given by tents against the summer sun. Supplies in closed tents or under tarpaulins sealed tightly to the ground may be heated dangerously; ventilation is desirable. On the other hand, protection against blowing sand is imperative. Camps and supply dumps should be to the windward of sandy areas, roads, etc., or on the lee side of mountains or ridges.

High humidities at high temperatures along the southern coast cause rapid deterioration of many supplies, especially leather, through mold and mildew. Adequate ventilation and frequent inspection are required.

b. Winter. What rains Iran receives fall mostly in winter, at times causing flash floods in otherwise dry watercourses; arroyos (or wadis) and alluvial fans at the mouths of canyons and valleys are dangerous sites for camps and dumps. Salt and alkali flats can turn into quagmires during rainy periods.

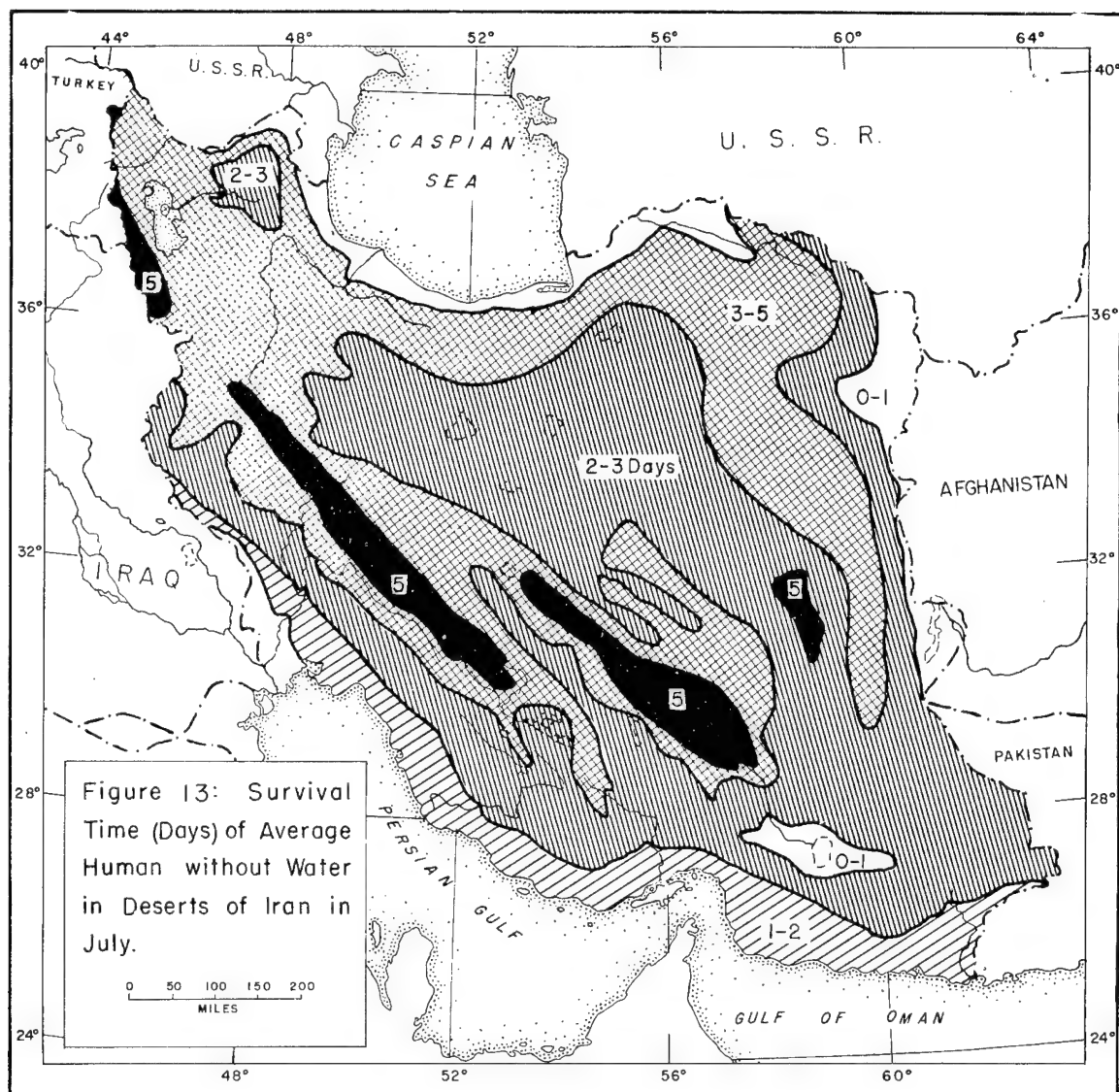
Floors for tents, and dunnage for supplies, are desirable in winter, but may be difficult to obtain locally, except for the usually plentiful stones. However, where floors are most needed, in the wet and cool Caspian Coastland, timber from local forests may be used.

Sub-freezing temperatures in the mountains and higher plateau areas require protection of some supplies, and make heating of shelters desirable. Heating requirements in Iran are as diverse as those of the United States: none at all along the southern coast, eight months per year at Kermanshah (4,860 feet in northwestern Iran).



Average heating requirements, in degree-day units, are shown in Figure 12. One degree-day unit is represented by a day with an average temperature of 64°, 1° below the 65° base; 10 units are represented by 10 such days, or one day with an average temperature of 55°. Heating requirements at Meshed correspond to those of Albuquerque, N. M.; at Kermanshah to Washington, D. C.; at Jask to Key West, Fla., at Zahidan to Phoenix, Ariz.; and Teheran to Little Rock, Ark.

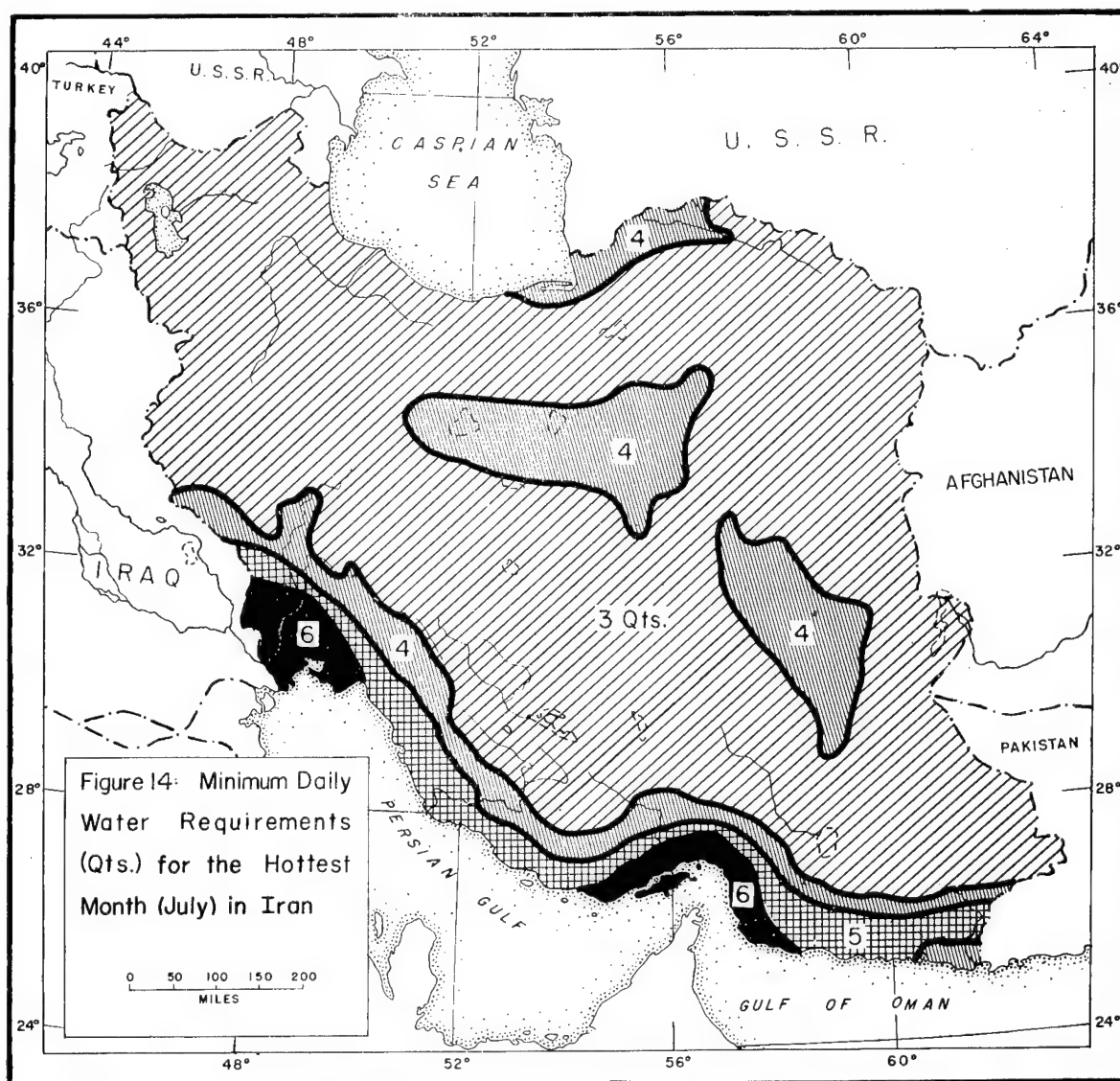
Wood for fuel is plentiful on the windward slopes of the Elburz Mountains and is available in limited quantities on the high windward slopes of the mountains of the west and south; in the semi-arid sections it is confined largely to brushwood. Some coal is mined on the flanks of the Elburz Mountains, but very little is used for domestic heating. Petroleum is the one fuel that Iran possesses in abundance, but it is produced largely for export, and wood and charcoal are the chief fuels for Iranian homes.



5. Food, Water, and Insects

a. Food. In hot, dry Iran food requirements are modest but large amounts of water are needed. Food needs, in terms of calories per day for men doing moderately hard to hard muscular work, increase from a minimum of around 3,300 when temperatures are above 77° to around 4,100 at freezing, and more at colder temperatures. In July, when most of Iran has temperatures well above 77°, food requirements are at a minimum; in January they range from about 3,500 at Jask to 4,400 at Tabriz. Average annual requirements vary from 3,350 at Jask to 4,000 at Teheran -- about the same as throughout the southern half of the United States.

b. Water Needs. Water is much more of a problem: it is scarce or lacking over most of Iran, and where it is available it is likely to be contaminated.



In the interior in July, a man without water can last about 4-1/2 days if he rests during the day and walks at night, and a little more than 5 days if he does not walk at all (Fig. 13). At lower temperatures in the highlands, in July, the corresponding times are about 11-1/2 and 13 days, respectively. By the end of these periods he will be so exhausted through dehydration that he cannot walk at all, although he will revive quickly as soon as he drinks enough water (cool but not cold: ice water may cause vomiting.)

Figure 13 shows the average number of days, in July, on which a man without water can still walk at night; after 10 percent dehydration further activity is impossible. Death is likely after 20 percent dehydration, which takes about 2.3 times as long as the 10 percent values of Figure 13, if walking is done only at night, and 2.6 times as long if no

walking whatever is attempted. About 15 to 20 miles can be walked per night.

In the hottest part of Iran, the southwest corner, a man without water can remain active only about 1 day in July, and can remain alive for only 2 or 3 days; in the mountains, corresponding figures are 5 and 18 days. Minimum water requirements during the hottest month in Iran, for men at rest, vary from 6 quarts per day along the southern coast (Fig. 14) to only 3 quarts per day over most of the plateau.

c. Water supplies. Lack of any extensive rivers, such as the Colorado in the comparable portion of the United States, the Nile in Egypt and the Indus in northwestern Pakistan, has forced Iranians to develop small local supplies of water for drinking and irrigation. Some open channels and ditches have been built from the few large streams, and there are numerous wells, but most of Iran's water supply comes from kanats.

Kanats are tunnels dug in the beds of dry streams, particularly along alluvial fans emerging from mountains, to catch the subsurface water and conduct it, underground to minimize evaporation, to the places of use. In some cases water is drawn up from the kanat as from a well, in others the kanat eventually reaches the surface and becomes an open ditch. Similar tunnels have been used for centuries in Syria and North Africa.

Kanats are the principal water supply for many cities of the interior, including Teheran, Isfahan, Meshed, Kerman, Kashan, and Yezd. Kanat water is less subject to contamination than that of surface channels, but all water in Iran should be suspect; in many cases, sewage is dumped into the same channels from which water is taken for drinking, washing, and irrigation. Iranians usually boil their water for tea.

Although plentiful on the Caspian coast, water there is also likely to be contaminated. The Caspian itself is only about three-eighths as salty as the ocean, and its water can be drunk if necessary. On the arid southern coasts, water supply is a particularly grave problem. The scanty rain is stored in cisterns (well water is often brackish), and the larger ports (Abadan and Bandar Shapur) import water by rail or barge.

d. Insects. Despite its general aridity, Iran is plagued by many insects affecting health and comfort, including mosquitoes, lice, fleas, ticks, bedbugs, sand flies, and house flies. Poor sanitary methods, some religious prejudices, and ignorance as to preventive measures, have contributed to a high incidence of insect-carried diseases.

Mosquitoes, of which several anopheline species are native to Iran, carry malaria, by far the leading cause of poor health in Iran. Highly malarial districts are present in both highlands and lowlands, but are not found in the large kavirs of the interior and the Southern Lut. Favorable environments for mosquito breeding are provided by stagnant water in the swamps on the Caspian Coast and Shatt-al-Arab delta land,

irrigation ditches all over the country, and rice fields, wells, cisterns, cow sheds, and brackish pools. Some insects may travel as much as a mile in search of food, and the location of breeding places should be considered in choosing bivouac sites.

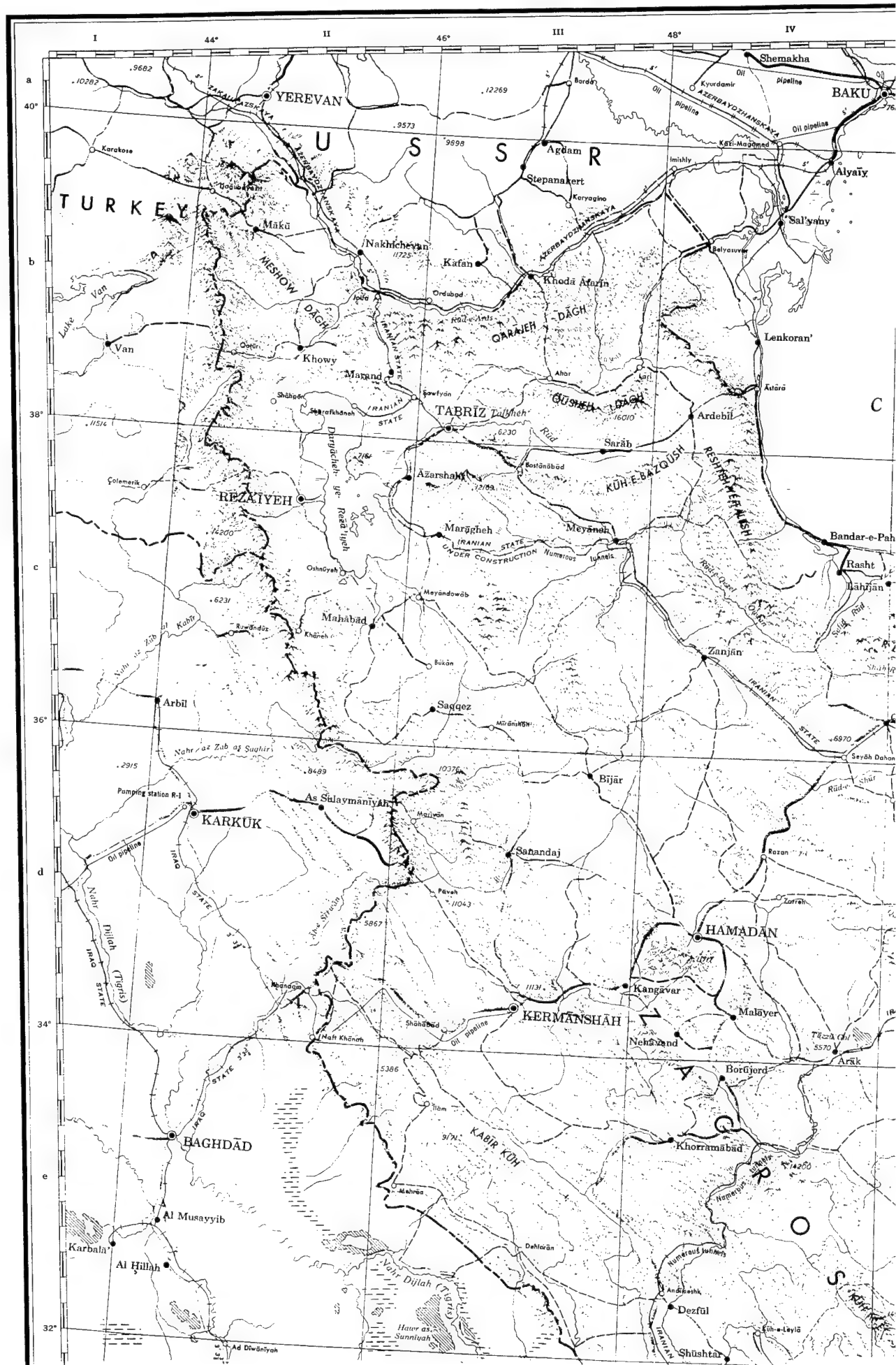
Head lice, body lice, and pubic lice are common in Iran. All are annoying and likely to carry typhus fever, trench fever, and relapsing fever.

Fleas are not only annoying pests but also carriers of typhus fever and bubonic plague. Those prevalent in Iran include rat fleas, cat fleas, and human fleas.

Ticks, of which three species are present in Iran, are known to be carriers of relapsing fever; both animals and vegetation may serve as hosts.

Bedbugs, which thrive wherever they can associate with man, the favorite host, are thought to be capable of transmitting leishmania and relapsing fever, and may also be mechanical carriers of other diseases.

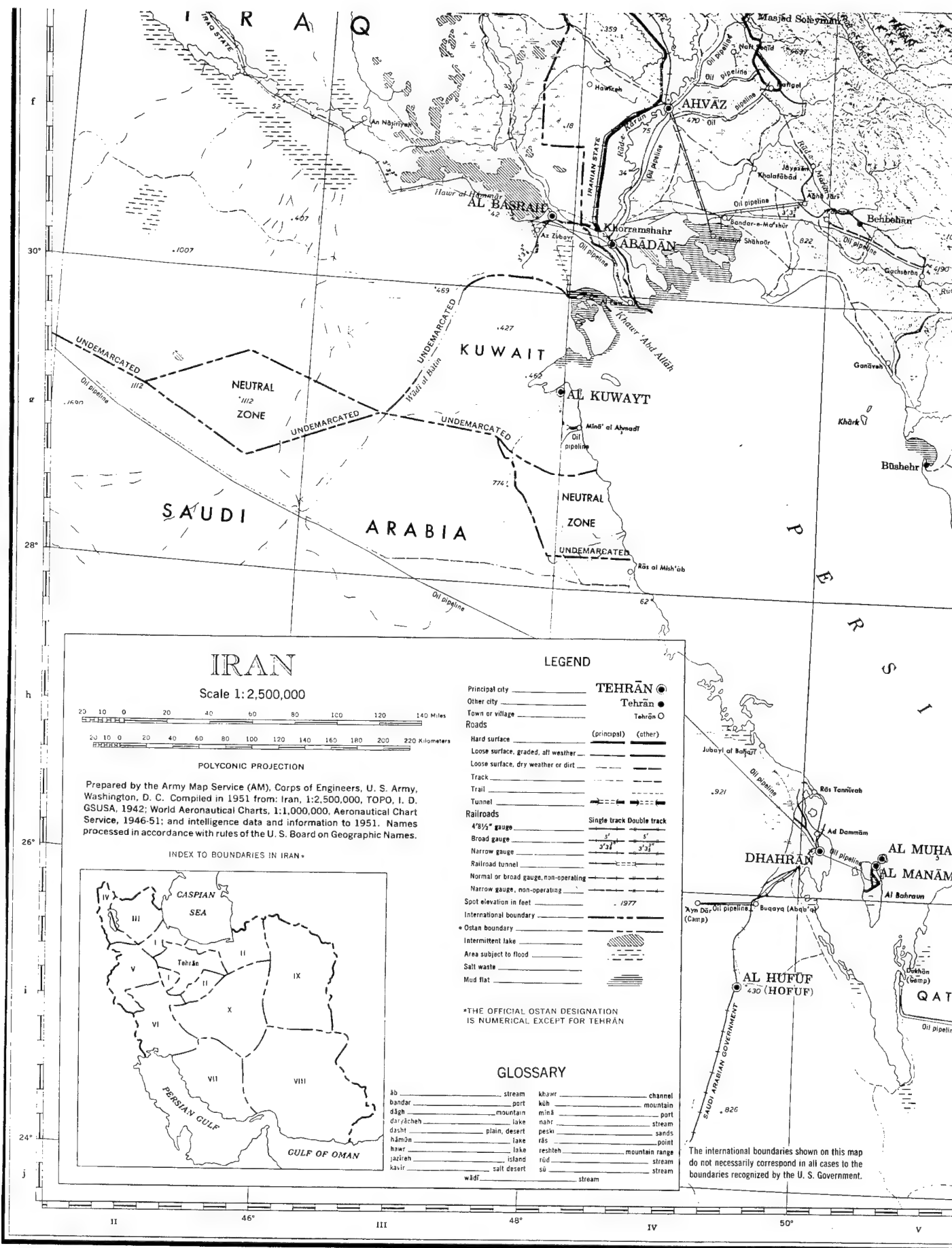
Sandflies, small gnats which are especially annoying because of their biting, are widely distributed over Iran; one species is the chief carrier of sandfly fever and also leishmania. Breeding season in north Iran is from April to October, in the south in both spring and autumn. Sandflies may travel 2 or 3 miles from their breeding place, and camp sites should be to windward of known places of infestation. Houseflies, representing 98 percent of all the flies that appear indoors, are a pest common wherever men go, except at low temperatures or when proper sanitary measures are observed. Flies as scavengers are beneficial, but at the same time they are vectors of dysentery, diarrhea, and typhoid fever. Although the worst human fly pest is the housefly, other species torment animals, such as the camel fly, horse fly, green bottle fly (which attacks humans as well), and the horn fly; some are carriers of animal diseases to which humans are susceptible. In addition to being carrion feeders, most flies are attracted by open wounds and may carry such infections as leishmania, anthrax, intestinal and subcutaneous myiasis, and eye diseases.

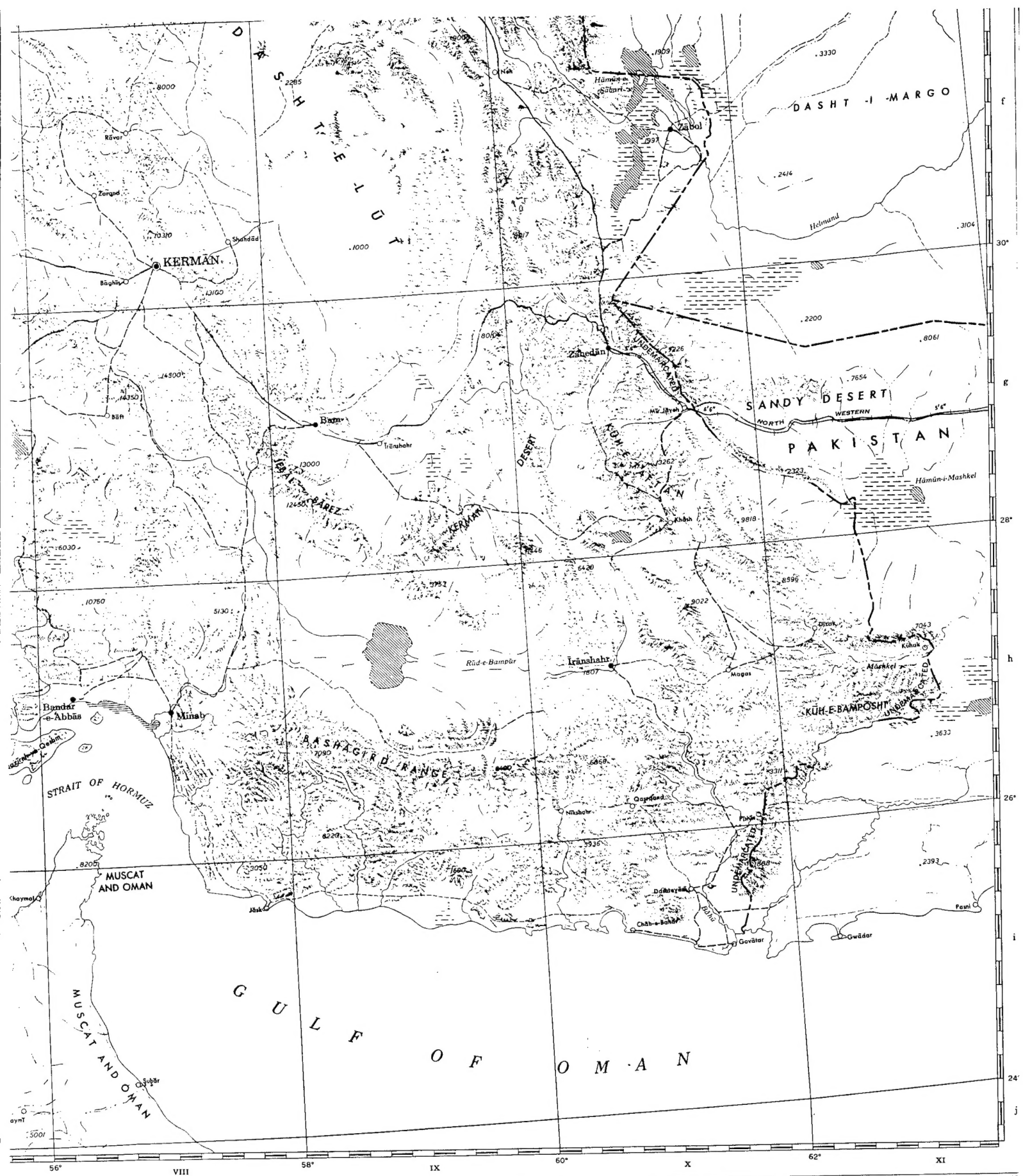


(1)









D I S T R I B U T I O N L I S T "B"

ARMY

QUARTERMASTER CORPS

- 100 Office of The Quartermaster General, R & D Div.,
Research Information Office
- Philadelphia QM Depot, 2800 South 20th St., Philadelphia, Pa.
- 4 Technical Library (File: 3; Dr. Rainey: 1)
- QM R & D Laboratories, Philadelphia, Pa.
- 1 The Pioneering Research Laboratories Branch (Dr. Sin)
- 1 Jeffersonville QMD, Res. & Dev. Div.
- 3 QM Food & Container Institute, 1819 W. Pershing Rd.,
Chicago 9, Ill.
- QM Center, Ft. Lee, Va.
- 3 QM Board, President
- 1 QM Technical Training Service Library
- QM Liaison Officer, TSKQM, QMC, Dayton, Wright AFB
- 1 Air Proving Ground
- 2 Senior U.S. Rep. in Canada, Maj. Wm. C. Deekle, Jr., QMC
Tech. Rep., DID 224 Wellington St., Ottawa
- 2 Senior U.S. Rep. in United Kingdom, Lt. Col. Edwin G. Beggs,
QMC Tech. Rep., Off. of Mil. Attache, U.S. Navy 100, FPO, N.Y.
- 3 Army Liaison Officer, (Col. H. E. Harwood), Office of Naval
Research, Washington 25, D.C.

GENERAL STAFF, U.S. ARMY

- 2 Asst. Chief/Staff, G-2: Chief, ID44, 2845 Main Navy
- Asst. Chief/Staff, G-3: The Pentagon
- 1 Operations Division
- 1 Organization & Training Division
- 1 Plans Division
- Asst. Chief/Staff, G-4: Res. & Dev. Div., The Pentagon
- 12 Research Br., Envir. Res. Section (Drs. Siple & Coman)

ARMY FIELD FORCES

- 1 Commanding General, Ft. Monroe, Va.
- 1 Board No. 1, Ft. Bragg, N.C. (Attn: QM)
- 1 Board No. 2, Ft. Knox, Ky. (Attn: QM)
- 3 Board No. 3, Ft. Benning, Ga.
(Attn: QM 1)
(Attn: Adjutant-Sec. 1)
(Attn: Col. Detweiler 1)
- 1 Board No. 4, Ft. Bliss, Tex. (Attn: QM)
- 2 ARMY LIBRARY, The Pentagon (Librarian: 1; Nat. Def. Rev: 1)
- 1 NATIONAL WAR COLLEGE, Library, Ft. McNair, Washington 25, D.C.
- 2 CG, ALASKAN DEPT., APO 942, Seattle, Wash.
(Arctic Cent. Lib: 1; QM: 1)
- 1 COMMANDANT, COMMAND & GEN. STAFF COLLEGE, Ft. Leavenworth, Kans.
- 1 COMMANDANT, ARMY WAR COLLEGE, Ft. Leavenworth, Kans.
- 1 COMMANDANT, U.S. MILITARY ACADEMY, West Point, N.Y.

CHEMICAL CORPS

- 1 Tech. Command, Army Chemical Center, Md.
(Attn: Prot. Div. Lib.)
- 1 Met. Div., Camp Detrick, Md.

CORPS OF ENGINEERS

- 1 Eng. Res. & Dev. Div., T-7, Gravelly Point, Va.
- 1 Eng. Res. & Dev. Lab., Ft. Belvoir, Va.
(Attn: Dr. L.R. Whiting)
- 1 SIPPE, 1215 Washington Ave., Wilmette, Illinois
(*5 on snow and ice reports)
- 1 Co-op Snow Investig., Oakland, Cal., Army Base
(Attn: Mr. D. Miller)
- 1 Missouri River Div., PO Box 1216, Omaha, Neb.
(Attn: Mr. E.W. McClelland)
- 1 ORDNANCE DEPARTMENT, Res. & Dev. Div., The Pentagon

SIGNAL CORPS

- 2 Eng. & Tech. Div., The Pentagon (SIGGE-M: 1; SIGGG-C4: 1)
- 1 Evans Signal Lab., Belmar, N.J.

SURGEON GENERAL

- 1 Chairman, Res. & Dev. Bd., 2749 Main Navy
- 1 Army Medical Library, Washington 25, D.C.
- 1 CO, Army Medical Res. Lab., Ft. Knox, Ky.
(Drs. Daggs & Keller)

TRANSPORTATION CORPS

- 1 Asst. Chief for Eng. & Dev., 1833 T-7, Gravelly Pt., Va.

RESEARCH & DEVELOPMENT BOARD, The Pentagon, Wash. 25, D.C.

- 6 Secretariat, Comm. on Geophys & Geog.
- 28 Appropriate Panel

AIR FORCE

- 2 HQ, USAF, DC/S Mat., Res. & Dev., Pentagon
- 1 AIR WEATHER SERVICE, Andrews AFB, Washington, D.C.
- 1 Chief (Attn: Mr. R.D. Stone)
- 1 Military Climatology (Attn: Dr. Jacobs)

AIR UNIVERSITY

- 1 ADTIC, Research Studies Institute, Maxwell AFB, Ala.
- 1 Library, Maxwell AFB, Ala.
- 1 School of Aviation Medicine, Randolph AFB, Tex.

AIR MATERIAL COMMAND

- 1 Eng. Fld. Off., 4949 Main Navy, (Attn: Mr. Butler)
- 1 ARCTIC AIR MEDICAL LAB., APO 731, Seattle, Washington
- 1 GEOPHYSICAL RESEARCH DIRECTORATE, Cambridge Research Labs.,
Albany Street, Cambridge, Mass.

NAVY

- 1 BUREAU OF YARDS & DOCKS, Res. Div., Washington, D.C. (P-313-B)
- 1 USN ELECTRONICS LAB., San Diego, Cal. (Liaison Off.)
- OFFICE OF NAVAL RESEARCH, Washington 25, D.C.
- 2 Earth Sci. Div., 2519 T-3 (Geog: 1; Geophys: 1)
- 1 Navy Res. Sec., Library of Congress (Attn: Mr. J.H. Heald)
- HYDROGRAPHIC OFFICE, Washington 25, D.C.

- 1 Librarian
- 1 Div. of Oceanography (Attn: Messrs. Allen & Bates)

MARINE CORPS

- 1 Supply Dept., Gen. Supply Sec., Rm 4136, USMC Wg, Arl.
Washington D.C. (Attn: Col. J.F. Stamm)
- 1 USMC Supply Depot, 1100 S. Broad St., Phila. 46, Pa.
(Attn: Capt. Misura)

CIVILIAN

- 1 ATOMIC ENERGY COM., 1901 Const. Ave., Wash. 25, D.C.
(Librarian)
- 1 Sandia Lab., Classif. Document Div., PO 5800,
Albuquerque, N.M. (Attn: Mr. Dale N. Evans)
- 2 COMMERCE DEPT., Weather Bureau, Library,
Washington 25, D.C.
- 1 INTERIOR DEPT., Board on Geog. Names, Wash. 25, D.C.
(Attn: Dr. Burrill)
- 1 SMITHSONIAN INSTITUTION, Washington 25, D.C.
(Attn: Dr. Kellogg)
- 1 CENTRAL INTELLIGENCE AGENCY (Collection & Dissemination)
Washington 25, D.C.

~~RESTRICTED SECURITY INFORMATION~~
~~RESTRICTED SECURITY INFORMATION~~

UNCLASSIFIED

UNCLASSIFIED

~~RESTRICTED SECURITY INFORMATION~~
~~RESTRICTED SECURITY INFORMATION~~